Abstracts Presented at the 2022 Mid-Year Congress International Neuropsychological Society Federación de Asociaciones de Neuropsicología Españolas Consorcio de Neuropsicología Clínica Federation of the European Societies of Neuropsychology

July 6-8, 2022
Barcelona, Spain

CE Workshop 01: Neuropsychological rehabilitation for attention and executive functioning: evidence-based strategies

Presenter: Jon Evans

9:00-12:00h
Wednesday, July 6, 2022

Abstract & Learning Objectives:
Attention and executive functions are fundamental for successful everyday living, frequently impaired by brain injury or disease, and therefore important targets for rehabilitation interventions. This session will begin with an overview of some of the key theoretical frameworks that aim to explain the cognitive and anatomical systems that support attention and executive functions. The use of these theoretical models in the formulation of attention and executive dysfunction in the context of brain in- jury or disease will be discussed. There will be a particular focus on the use of formulation to drive the selection of appropriate rehabilitation interventions. A range of evidence-based approaches to the rehabilitation of attention and executive functions will be presented, illustrated with examples of their application in clinical practice.

Upon conclusion of this course, learners will be able to:
1) Describe, and appraise, current theoretical models of attention and executive functioning
2) Describe how the assessment and formulation of attention and executive functions can be used to guide selection of appropriate approaches to intervention in people with acquired brain injury
3) Describe a range of evidence-based approaches to managing attention/executive functions and how they can be applied in clinical practice.

CE Workshop 02: Social Cognition: How to intervene and what works

Presenter: Skye McDonald

9:00- 12:00h
Wednesday July 6, 2022

Abstract & Learning Objectives:
This session will introduce participants to basic constructs associated with social cognition and also some common instruments used for measurement. It will then focus on social cognition remediation. This will commence with a coverage of theory and main tenets associated with remediating social cognition based on the literature that spans the treatment of social cognition impairments arising from neurodevelopmental, neuropsychiatric and neurological disorders. It will discuss theoretical approaches based on principles of cognitive remediation, behavioural approaches and cognitive behavioural therapy. Specific aspects of remediation that take into account poor cognitive abilities and facilitate generalization, relevance and motivation will be covered. By way of example, the workshop will focus on some specific treatment approaches for remediating emotion perception, social skills and theory of mind (metalizing).

Upon conclusion of this course, learners will be able to:
1) Describe different theoretical approaches to remediating social cognition
2) Explain why certain approaches may be more suitable than others for different kinds of social cognitive impairment
3) Select the most appropriate approach to remediating social cognition for the kind of client you are working with.

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CE Workshop 03: Alzheimer's/Vascular Spectrum Dementia: Classification, Diagnosis, and Underlying Neuropathologie

Presenter: Melissa Lamar

9:00-12:00h
Wednesday, July 6, 2022

Abstract & Learning Objectives:
Conceptualizations surrounding Alzheimer's and Vascular dementias have changed, for some, over the decades since the original diagnostic criteria for these neurodegenerative disorders were introduced. What has not changed for any, is the fact that the number of people diagnosed and living with these dementias continues unabated and there is no cure in sight. While targeting specific neuropathologies for drug development may make heuristic sense, clinically, 'pure' forms of Alzheimer's and/or Vascular dementia are rare. This CE workshop will not only outline research attempting to elucidate the interplay of these two dementing disorders, but discuss what it means for clinical assessment and diagnosis, and how it is represented in the under- lying neuropathology present at death. Thus, while Alzheimer's and Vascular dementias may have distinguishing cognitive features in the earliest stages of disease, these features are more often than not present together for a more mixed profile of impairment. As the same may be said for their post-mortem neuropathological profiles, perhaps a better way to think of 'pure' Alzheimer's or Vascular dementia may be as two tails of a larger distribution along an Alzheimer's/Vascular Spectrum Dementia.

Upon conclusion of this course, learners will be able to:
1) Discuss research outlining the interplay of Alzheimer's and Vascular dementias
2) Explain assessment and diagnostic techniques for evaluating Alzheimer's/Vascular Spectrum Dementia in his/her/their practice
3) List the underlying neuropathological profiles that may be present at death in individuals along the Alzheimer's/Vascular Spectrum.

CE Workshop 04: Neuropsychological Assessment and diagnosis in culturally diverse populations

Presenter: T. Rune Nielsen

9:00-12:00h
Wednesday, July 6, 2022

Abstract & Learning Objectives:
Although a certain degree of diversity has always been present in Europe, diversity levels have increased greatly over the last decades, starting with the immigration of labor workers from countries outside Europe in the 1960s and 1970s, followed by the influx of asylum seekers and refugees in more recent years. Several minority ethnic groups are at an increased risk of medical conditions that are associated with cognitive impairment, such as stroke, diabetes mellitus, and dementia. As a result, neuropsychologists in Europe will increasingly encounter patients from minority ethnic groups in their daily practice.
Several characteristics of minority ethnic groups may pose unique challenges to neuropsychologists. First, limited proficiency in the host country language is widespread among recently arrived immigrants and older people in some minority ethnic groups. Second, neuropsychologists may encounter substantial cultural barriers in their clinical practice. Third, low education levels or illiteracy are common among (older) people in various minority ethnic groups. Taking these barriers into consideration, administering a cross-cultural neuropsychological assessment requires neuropsychologists to acquire culture-competent skills and knowledge.
This workshop will present and discus how language, (quality of) education, literacy, and culture may influence neuropsychological assessment based on recent research and clinical examples from the European context. Further, several newly developed cross-cultural neuropsychological tests for minority ethnic groups in Europe will be presented.

Upon conclusion of this course, learners will be able to:
1) To predict and explain language, cultural and educational influences on cognition and neuropsychological test performance
2) To critically reflect on the validity and outcome of various neuropsychological tests when used for cross-cultural assessments
3) To use this knowledge to prepare and conduct culturally informed neuropsychological assessments.

Plenary Keynote Address: Improving Recovery in People with Schizophrenia through Cognitive Remediation Therapies

Presenter: Til Wykes

12:00-13:00h
Wednesday, July 6, 2022

Lunch Break

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13:00-14:00h
Wednesday, July 6, 2022

Paper Session 01: Interventions in TBI

14:00- 15:20h
Wednesday, July 6, 2022

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1 Managing Agitation During Early Recovery Following Traumatic Brain Injury: A Clinician Perspective

Sarah Carrier[1,2] , Jennie Ponsford[1,2,3] , Adam McKay[1,2,3]
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[2]Monash-Epworth Rehabilitation Research Centre, Epworth Healthcare, Melbourne, Australia
[3]Rehabilitation and Mental Health Division, Epworth Healthcare, Melbourne, Australia

Objective: Agitated behaviours pose a significant challenge during the early stages of recovery following traumatic brain injury (TBI). The aim of this study was to gain a deeper understanding of how clinicians around the world manage post-TBI agitation. It is important that we understand the factors that influence how clinicians manage agitation to help inform the use of consistent and effective management strategies for reducing agitation in TBI care.
Participants and Methods: Using a qualitative design, interviews were conducted with 33 clinicians (58% female, aged 23-71 years) from 16 countries who had experience in working with agitated patients. A semi-structured interview schedule was used to explore the experiences and approaches used by clinicians to manage agitation during early TBI recovery.
Results: Interviews were transcribed and analysed using reflexive thematic analysis. The central theme of the clinician interviews was the effective management of agitation, of which there were three key sub-themes: managing the safety of staff and patients as a priority, identifying and reducing triggers for agitation and implementing behavioural principles for managing agitation. There were two overarching factors that influenced the effective management of agitation: clinician-related factors, such as teamwork and developing rapport, and systemic factors, such as training and experience, and resource availability.
Conclusions: This study highlighted key approaches for the effective management of agitation during early TBI recovery as described by clinicians working with these patients worldwide. Clinicians shared a similar perspective on what constitutes effective agitation management, however, there were differences in implementation across settings due to several key challenges. Future areas of focus for improving agitation management should include ongoing clinician training and support, consistent measurement of agitated behaviours and further evidence-based research involving effective interventions for managing agitation during early TBI recovery.

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2 A Short Add-On Sleep Intervention in the Rehabilitation of Individuals with Acquired Brain Injury: A RCT

Louise Pilon[1,2] , Nikita Frankenmolen[1,2] , Janna van der Zijpp[1] , Dirk Bertens[1,2]

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Objective: Sleep disturbances are common following acquired brain injury (ABI) and have a negative impact on cognitive and emotional functioning. Although sleep disturbances interfere with the rehabilitation process, directed treatment is often not part of standard rehabilitation care. Therefore, a short add-on sleep intervention was developed for patients with ABI in an outpatient rehabilitation setting aimed at altering dysfunctional sleep patterns. This randomized controlled trial (RCT) examines whether this short add-on therapy for sleep disturbances in individuals with ABI is effective in addition to rehabilitation treatment as usual.
Participants and Methods: A total of 54 adults (range: 18-73 years old) with ABI (³ 3 months post-injury) and self-reported sleep disturbances receiving outpatient rehabilitation services were included and randomly allocated to a treatment or wait-list control group. The treatment group received a sleep intervention (four sessions in a six week period) in addition to their rehabilitation treatment. Participants in the wait-list control group received rehabilitation treatment as usual and were placed on a wait-list of six weeks before receiving the sleep therapy. The sleep intervention is based on cognitive behavioural therapy for insomnia (CBT-I) and

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consists of psychoeducation, sleep hygiene, stimulus control and an adapted form of sleep restriction. Baseline and post-treatment assessments were conducted.
The main outcome measure was sleep quality, measured by the self-report Pittsburg Sleep Quality Index (PSQI). Secondary outcome measures were the Hospital Anxiety and Depression Scale (HADS), the subtests of the Dutch Multifactor Fatigue Scale (DMFS) and the Dysfunctional Beliefs and Attitudes about Sleep (DBAS-16).
Results: Analyses were performed with 41 participants that completed both assessments: 23 in the treatment group and 18 in the wait-list control group. Results showed that the short add-on sleep therapy resulted in better sleep quality (i.e. PSQI) in the treatment group as compared to the wait-list control group (p= < .001, *eta*= .449, 95% CI [2.65-5.67). Post-treatment, 11/23 participants (48%) had a PSQI score below the cut-off score for insomnia, compared to 2/18 (11%) in the wait-list control group. Furthermore, participants who received the sleep therapy reported less dysfunctional beliefs and attitudes about sleep (p= .001, *eta*= .237, 95% CI [.38-1.45]), experienced a smaller impact of fatigue in daily life (p= .030, *eta*= .118, 95% CI [.48-9.07]) and were better able to cope with fatigue (p= .008, *eta*= .169, 95% CI [.72-4.59]) compared to participants in the wait-list control group. No significant improvements were found regarding consequences or symptoms of fatigue, mental and physical fatigue nor in anxiety and depressive symptoms.
Conclusions: In this RCT, a short CBT-I based sleep intervention produced significant improvements in sleep quality and fatigue in people with ABI in addition to rehabilitation treatment as usual. The application of this short add-on sleep intervention could be implemented in neuropsychological rehabilitation settings.

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3 Non-Pharmacological Interventions for Agitation During Early TBI Recovery: A Systematic Review

Sarah Carrier[1,2] , Jennie Ponsford[1,2,3] , Ruby Phyland[1,2] , Amelia Hicks[1,2] , Adam McKay[1,2,3]

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Objective: Agitation is commonly observed in the early recovery period following traumatic brain injury (TBI), known as post-traumatic amnesia (PTA). Non-pharmacological interventions are often used to manage agitation, yet their efficacy is largely unknown. The aim of this systematic review was to synthesise current evidence on the effectiveness of non-pharmacological interventions for reducing agitation during PTA in adults with TBI.
Participants and Methods: Key databases searched included MEDLINE Ovid SP interface, PubMed, CINAHL, Excerpta Medica Database, PsycINFO and CENTRAL, with additional online reviewing of key journals and clinical trial registries to identify published or unpublished studies up to May 2020. Eligible studies included participants aged 16 years and older, showing agitated behaviours during PTA. Any non-pharmacological interventions for reducing agitation were considered, with any comparator accepted. Eligible studies were critically appraised for methodological quality using Joanna Briggs Institute Critical Appraisal Instruments and findings were reported in narrative form.
Results: Twelve studies were included in the review: two randomised cross-over trials, three quasi-experimental studies, four cases series and three case reports. Non-pharmacological interventions included music therapy, behavioural and environmental strategies (such as antecedent modification and contingency management), physical restraints and electroconvulsive therapy. Key methodological concerns included the absence of a control group, a lack of formalised agitation measurement and inconsistent concomitant use of pharmacology. Interventions involving music therapy had the highest level of evidence, although the studies were generally of low to moderate quality.
Conclusions: Overall, there was a lack of evidence for the effectiveness of any non-pharmacological interventions for managing agitation during the PTA period following TBI. Randomised controlled trials with the inclusion of a control group and the use of a formal measurement tool for assessing agitation are a critical next step in developing suitable recommendations for the effective non-pharmacological management of agitation after TBI.

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4 Two Methods of Providing Behavioural Activation in Acquired Brain Injury: A Randomised Pilot Feasibility Trial

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Andrea Kusec[1] , Fionnuala C. Murphy[1] , Polly V. Peers[1] , Verity Smith[1] , Ron Bennett[2] , Estela Carmona[1] , Aleksandra Korbacz[1] , Cara Lawrence[3] , Emma Cameron[4] , Andrew Bateman[5] , Peter Watson[1] , Judith Allanson[6] , Pieter duToit[2] , Tom Manly[1]

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Objective: Acquired brain injury (ABI) is linked to markedly increased rates of depression. Existing therapies for depression in ABI such as Cognitive Behavioural Therapy have mixed efficacy. Behavioural activation (BA), an intervention that encourages planning and engaging in positively reinforcing activities, is a promising alternative. Here, we assess the feasibility, acceptability, and potential efficacy of two BA groups. The Activity Planning group (traditional BA) trains participants to identify and plan reinforcing activities over 8 weeks using executive management strategies. The Activity Engagement group (experiential BA) focuses on direct engagement in positive experiences within weekly group sessions, without explicitly encouraging increases in activity levels outside of session time. Both traditional and experiential BA groups were compared to participants randomised to an 8-week Waitlist group.
Participants and Methods: Adults (≥ 18 years) recruited from local ABI services and charities were randomised to condition. Feasibility and acceptability of the interventions were assessed via recruitment, retention, and attendance. Participants additionally provided qualitative feedback post-intervention on perceived helpfulness of the group. Qualitative data was analysed using interpretive description methodology. In order to assess potential efficacy, blind assessments of self-reported activity levels, depression, and anxiety (at pre- and post-intervention and 1 month follow up) were compared across the three trial arms using mixed-effects modelling.
Results: Data were collected both in person and remotely using videoconferencing due to COVID-19 restrictions. $N = 60$ participants were randomised to the Activity Planning (AP) Group (total $n = 29$), the Activity Engagement (AE) Group (total $n = 28$), or re-randomised following Waitlist (WL; total $n = 17$). Whether delivered in person or remotely, both groups were perceived as similarly enjoyable ($t = 0.27$, $p = 0.79$), though the AP Group was viewed to be more helpful ($t = 2.15$, $p < 0.05$). In exploring efficacy, 58.33% of individuals in the AP Group had clinically meaningful improvements in activity levels, relative to 50% and 38.5% in the AE and WL groups, respectively. Further, both the AP ($t = -4.30$, $p < 0.001$) and AE ($t = -4.60$, $p < 0.001$) groups showed statistically significant reductions in depression symptoms relative to WL participants, but only the AP group demonstrated significant reductions in anxiety relative to the AE ($t = -3.98$, $p < 0.001$) and WL groups ($t = -4.13$, $p < 0.001$). In the qualitative data, participants in both the AP and AE groups reported benefitting from a positive group atmosphere. AP group members further noted benefits of learning strategies to increase activity levels, and challenge negative preconceptions about their abilities through weekly planning. AE group members valued social discussion and autonomy in selecting within-session activities.
Conclusions: Both in person and remote group BA is a feasible and low-cost alternative to improving mood in ABI via increased activity levels. Though both traditional and experiential BA may be effective methods of improving mood in ABI, there may be different mechanisms driving this process. Traditional BA seems to provide additional benefits beyond reduction of depression symptoms.

Paper Session 02: Factors related to healthy aging

14:00- 15:20h
Wednesday, July 6, 2022

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1 Cognition and Brain Connectivity in Highly Cognitively Active Older Individuals. The NEUROPREVENT Project

Javier Oltra-Cucarella[1] , Clara Iñesta Carrizosa[1] , Beatriz Bonete-López[1] , Esther Sitges-Maciá[1]

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Objective: Engaging in cognitively active activities increases the cognitive reserve, which in turn reduces the risk of cognitive decline and

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dementia in the elderly. It is important to know the cognitive functioning of cognitively active older adults and its association with brain structure and brain connectivity, thus allowing to identify the factors that protect against cognitive decline. The objective of this work is to present NEUROPREVENT, a nationally funded research project at the University Miguel Hernández (UMH; Elche, Spain) to analyze longitudinally the association between cognition and brain connectivity in highly cognitively active Spanish older adults (individuals attending university classes at the UMH - SABIEX).
Participants and Methods: Forty adults aged 55 or older will be assessed twice over a one-year period with a comprehensive neuropsychological battery covering attention, speed of information processing, verbal and visual memory, language, executive function and visuospatial abilities. Triple magnetic resonance images (MRi) acquisitions will be acquired (see figure 1): fMRi at rest, high resolution anatomical images and diffusion tensor imaging (DTI). After state-of-the-art image processing pipeline, two classes of brain networks will be obtained: functional connectivity (FC) accounting for the similarity of the fMRi dynamics of different brain regions, and structural connectivity (SC) quantifying different aspects of the white-matter tracts between the different regions. These data will be compared with 40 individuals recruited from the general population.
Results: Currently, 16 participants have undergone both neuropsychological assessment and MRi acquisition. We will analyze the association between brain volumetry, brain connectivity and cognitive functioning at baseline, and will analyze which factors are associated with cognitive decline after one year. Currently, cognitively active individuals are slightly older (mean difference (MD) = -2.18, p = .030), have fewer years of education (MD = 2.89, p = .004), but have similar cognitive functioning (MD = -0.5, p = .611) and independence in activities of daily living (MD = 0.5, p = .614). Cognitively active individuals engage more frequently in stimulating cognitive activities compared to individuals from the general population (MD = -2.98, p = .003). However, at baseline, the proportion of participants with one or more low scores at is similar between cognitively active participants and individuals from the community (SABIEX = 51.5%, Community = 50%, p = .887).
Conclusions: The results obtained in this mixed design will increase our knowledge about brain volumetry and connectivity and cognitive functioning, and will also allow analyzing the factors that protect against longitudinal cognitive decline in Spanish people aged 55 years or older. The data from the NEUROPREVENT project will allow comparing the diagnostic value of cognition and neuroimaging to detect the factors associated with longitudinal cognitive decline in highly cognitively active older adults.

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2 Psychological Well-Being and Salivary Markers of Inflammation: The Moderating Effect of Age

Sung-Ha Lee[1] , Jeanyung Chey[1] , Woo-Young Ahn[1] , Choong-Wan Woo[2] , Yoosik Youm[3] , Hairin Kim[1] , Naeun Oh[1] , Hyeyoung Park[1] , Suhwan Gim[2] , Eunjin Lee[2] , Incheol Choi[1]

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Objective: Increasing evidence suggests a significant impact of higher psychological well-being (PWB) on positive health outcomes. In particular, a strong sense of purpose in life is emerging as a protective factor that lowers systemic inflammation. However, such associations between PWB and biomarkers of inflammation have been studied exclusively in middle-aged to older adults, and, hence, whether the effects are the same in younger adults remains elusive. This study examined the aging effect on PWB measures as well as the moderating effect of age on the link between PWB and inflammatory markers using salivary markers of inflammation.
Participants and Methods: We investigated the associations between PWB and salivary markers of inflammation, including C-reactive protein (CRP), interleukin (IL)- 1 beta, and IL6. In a sample of 202 participants, we examined the effect of age on PWB measures —total scores as well as the six dimensions— and three inflammatory markers. We further examined whether such associations were moderated by age in the younger adult group (n = 127; mean age = 22.98 [SD = 2.93] and older adult group (n = 75; mean age = 75.60 [SD = 5.65]).
Results: Older adults showed significantly lower levels of PWB, especially in purpose in life and personal growth. After covarying for age, education, body mass index, chronic illness, anti-inflammatory medicine, and health-related behavior, higher purpose in life was associated with lower salivary IL1B and IL6 (b = 0.83, $p < .001$; b = 0.81, $p < 0.01$) only in the older adult group but not in younger adults. CRP levels did not show any association with

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well-being measures in either the younger or older group.
Conclusions: The findings suggest that while older adults report lower sense of purpose in life than younger adults, those who do report higher purpose in life showed lower level of salivary inflammation. These findings highlight the potential buffering effect of the sense of living well on neurophysiological pathways in later life. Also, future research is needed to evaluate other potential neurobiological pathways linked to sense of purpose in life in younger adults.

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3 Validation Study of the Korean version of Harmonized Cognitive Assessment Protocol (K-HCAP)

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Objective: Globally, life expectancy is increasing with improvement in living conditions and medical care, while fertility rate is decreasing in most industrialized countries, resulting in population aging. Being the fastest aging country in the world, South Korea is expected to become a country in which 4 out of 10 people would be over 65 years old in just 30 years. Accordingly, the prevalence of dementia is also steadily increasing, and the social costs of dementia and related diseases are considerable, presenting an unprecedented set of challenges to the society. The socioeconomic challenges of aging and aged societies have been studied in many advanced industrialized societies, Health and Retirement Study (HRS), being one of the most important population studies, that was initiated by the U.S. government in 1992. Thereafter, the HRS has been implemented in other countries, such as South Korea (KLOSA), South Africa (HAALSI), Mexico (MHAS), United Kingdom (ELSA), India (LASI), and China (CHARLS), promoting international collaboration. More recently the Harmonized Cognitive Assessment Protocol (HCAP) has been developed to assess cognitive aging and detect dementia, in order to (1) collect a large dataset to understand the determinants, prevalence, costs, and consequences of mild cognitive impairment (MCI) and dementia and (2) facilitate international harmonization of cognitive measurement and cross-national multidisciplinary studies of the determinants, prevalence, and impact of MCI and dementia.
Participants and Methods: In this study, we investigated the construct and the ecological validity of the Korean version of the HCAP in 168 community-residing older Koreans (mean age 70.24(6.8); mean years of education 9.2 (3.3)). The protocol consisted of tests of orientation (time, space), memory (word-list learning and Logical Memory), attention and processing speed (Trail A, cancellation, subtraction), construction (copying and drawing), language (fluency, naming, reading & writing, repetition), and executive function (Raven's matrices, Trail B, Number Series) which had been published in Korea or adapted to Korean during protocol development if unavailable. Factor structure of the cognitive tests included in the K-HCAP was identified through factor analysis, which was found to be comparable to those found in other countries, most similar to those of HRS and LASI.
Results: In terms of ecological validity, the scores of the cognitive tests were significantly associated with the activities of daily living functions as well as purpose of life measure, confirming the validity of the Korean version of HCAP. More specifically, partial correlation analysis confirmed that memory, executive function, and language ability were related to everyday functioning and activities of daily living measured by Community Screening Instrument for Dementia (CSI-D) and Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE). It was also found that executive function was associated with scores on Purpose of Life, which has been found be predictive of morbidity and mortality in late life.
Conclusion: Being the first study to introduce and validate HCAP in Korea and also being administered in digital format by trained lay-interviewers, it is expected to contribute to future studies collecting large scale community-based or population-based dataset of older Koreans' cognitive aging and prevalence of dementia in the rapidly aging country.

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4 English language proficiency & use as related to subjective cognitive decline & MCI in native Spanish speakers

Melissa Lamar[1,2] , Wassim Tarraf[3] , Benson Wu[4] , Jianwen Cai[5] , Richard Lipton[6] , Maria Llabre[7] , Mayra Estrella[2] , Linda Gallo[8] , Martha

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Objective: Bilingual experiences including levels of language proficiency and/or use have been differentially associated with cognitive aging and mild cognitive impairment (MCI); less is known about their relationship with subjective cognitive decline (SCD).
Participants and Methods: We investigated the bilingual experience, SCD, and MCI in native Spanish speaking Hispanic/Latino adults, i.e., those that self-reported they and their parents were born outside the 50 United States, reported using only Spanish or Spanish>English as a child, and used Spanish at the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) baseline visit (2008-2011) and, again, on average, seven years later as part of the SOL-Investigation of Neurocognitive Aging (2015-2018; unweighted SOL-INCA mean age~56 years, 56% female). Composite scores for baseline self-reported Spanish/English language proficiency (reading/speaking) and patterns of use (thinking/socializing) were rated using a Likert scale from 1=only Spanish to 4=English>Spanish. SCD was measured at 7-year follow-up using the Everyday Cognition Short Form (ECog-12); prevalent MCI was determined based on NIA-A criteria. Survey linear regression models examined the associations between bilingual experience composites (separately) and ECog-12 global and domain-specific scores, and prevalent MCI (separately) adjusting for age, sex, education, heritage, depressive symptomatology, income, field center, and time between baseline and follow-up visits.
Results: Higher levels of second-language (English) use were associated with less severe SCD at follow-up regardless of ECog-12 score (p-values<0.05). Higher second-language (English) proficiency was associated with less severe global and visuospatial SCD only (p-values<0.05). The majority of individuals (n=3,903) did not evidence severe cognitive impairment; within this majority, however, approximately 9.3% had prevalent MCI. Neither bilingualism experience composite score was associated with prevalent MCI.
Conclusion: In an analytic sample of mid- to late-life native Spanish speakers currently living in the US, second-language proficiency and use at baseline were differentially associated with less severe SCD. Conceptualizing specific aspects of the bilingual experience (e.g., second language proficiency), combined with an assessment of SCD may facilitate understanding of behavioral phenotypes less at risk for Alzheimer's disease and related dementias.

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5 Cognitive impairment indicator for the CLSA: Incorporating reliable change indices and a base rates

Megan E O'Connell[1] , Helena Kadlec[1] , Taler Vanessa[2] , Kristina Gicas[3] , Lauren E Griffith[4] , Christina Wolfson[5] , Susan Kirkland[6] , Parminder Raina[4]

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Objective: We previously defined and validated a dichotomous cognitive impairment/no cognitive indicator (CII) from a neuropsychological battery (tests of memory and executive function) with two Canadian Longitudinal Study on Aging (CLSA) cohorts. The CII approximates the clinical practice of interpretation across a neuropsychological battery using expected base rates of low score and can be applied to any neuropsychological dataset. For the current study, we developed a ΔCII that incorporates information from baseline and follow-up neuropsychological batteries and from reliable change formulae. Reliable change indices (RCIs) were calculated using standard regression-based methods and cross-validated. We applied the ΔCII to the

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CLSA longitudinal data and categorized participants as having cognitive impairment, no cognitive impairment, or being at risk for cognitive impairment. Finally, we described the rate of incident cognitive impairment in the CLSA.
Participants and Methods: Participants in the CLSA, a stratified random sample of community-dwelling adults aged 45-85 at baseline, received a telephone-administered neuropsychological battery (Tracking cohort, N = 21,241) or a longer in-person battery (Comprehensive cohort, N = 30,097). For the baseline and follow-up neuropsychological batteries (administered approximately 3 years apart), the ΔCII was based on a participant's low scores on each test, adjusted for base rates of expected low scores across the battery to determine overall cognitive impairment. Low scores were defined as less than or equal to 5% of scores relative to the normative subsample at baseline and robust normative subsample at follow-up (adjusted for practice). The ΔCII consisted of three categories: cognitive impairment, no cognitive impairment, and at risk for cognitive impairment. Changes over time on individual tests were determined using RCIs, and a base rate approach was used to determine overall cognitive decline. The at risk for cognitive impairment group was defined as (1) participants who did not meet our criteria of overall cognitive impairment but who were impaired on the same neuropsychological test over time or (2) participants whose performance was within normal limits, but they demonstrated overall cognitive decline. Finally, ΔCII was described for the subsample who were classified with no cognitive impairment on the CII at baseline to determine incident cognitive impairment.
Results: Participants with complete cognitive data at both timepoints were included. Of the 11,382 in the Tracking cohort (M_{age}= 66.1, SD_{age} = 10.3, 52% female), 92.9% had no cognitive impairment on the ΔCII, 3.7% were classified as at risk of cognitive impairment, and 3.3% were cognitively impaired. In the Comprehensive cohort (Comprehensive cohort n = 17,444, M_{age}=64.8, SD_{age} = 9.9, 51% female) 91.0% had no cognitive impairment, 6.2% were at risk, and 2.8% were impaired on the ΔCII. Incident cognitive impairment was 1.2% of 10,927 in the Tracking cohort who were classified as having no cognitive impairment at baseline and 1.8% of 16,686 in the Comprehensive cohort.
Conclusions: The ΔCII adjusts for practice effects and expected base rates of low scores across a neuropsychological battery and can be used to determine incident cognitive impairment in the CLSA. This approach can be applied more broadly to epidemiological studies that use neuropsychological batteries.

Paper Session 3: Neuropsychological Assessment & cultural related issues

14:00- 15:20h
Wednesday, July 6, 2022

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1 Neuropsychological Data Networking on an International Scale

Robert Bilder[1] , Russell Bauer[2] , Daniel Drane[5] , David Loring[5] , Laura Glass Umfleet[6] , Dustin Wahlstrom[7] , Keith Widaman[3] , Steven Reise[8] , Max Mansolf[4] , Kristen Enriquez[1] , Lucia Cavanagh[1] , Nelson Freimer[1] , Annabel Vreeker[9]

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Objective: Research on brain-behavior relations is being conducted on a large scale, increasingly involving multiple sites and spanning geographic, linguistic and cultural boundaries. This expansion has stimulated the need for common data elements (CDEs) that are transportable and that can enable harmonization of results for robust and replicable analyses. This paper aims to: (1) describe current efforts to develop sets of CDEs to cover essential aspects of the neuropsychological (NP) examination, including history taking, NP testing, behavioral observations, and self-report rating scales; (2) demonstrate a network infrastructure that supports acquisition and reporting of these CDEs; and (3) present findings showing how modern psychometric theory can be used to *harmonize* data across different instruments used in different countries with different languages, develop short adaptive tests from longer tests, and specify novel constructs that may emerge in patient groups differently from the test standardization samples.
Participants and Methods: Samples are drawn from two different projects: (1) more than 30,000 patients studied internationally by in the Whole Genome Sequencing in Psychiatric

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Disorders Consortium (WGSPD); and (2) more than 6,500 patients studied across four sites by the National Neuropsychology Network in the USA. In the first study, we show how factor alignment can be used to develop measures of shared constructs across diverse instruments, based solely on covariance structures, in an item-response theory framework. In the second study, we show the tools developed by the National Neuropsychology Network (NNN) including: the Structured History Protocol for Neuropsychology (SHiP-NP), the Structured Assessment of Item Level Observations and Responses (SAILOR), and the Behavioral Observation Assessment Tool (BOAT). NNN data are used to develop a computerized adaptive test model for the WAIS-IV Matrix Reasoning subtest, and to assess measurement invariance between the NNN sample and the standardization samples used for the WAIS-IV, WMS-IV, D-KEFS and CVLT3.
Results: The WGSPD analyses were successfully harmonized to define latent constructs for various psychopathological dimensions, with marked reduction in apparent measurement error across sites, languages and instruments. The newly defined constructs also showed concurrent validity with respect to external variables including age and sex and showed robust heritability in genome-wide association analyses. The NNN analyses reveal that the 26-item Matrix Reasoning subtest probably could be reduced to a 5-to-10 item adaptive short form with minimal loss of information. The measurement invariance analyses revealed generally strong invariance of key constructs measured across clinical conditions and healthy volunteers, but selected constructs, particularly recognition memory and inhibition/switching, are better defined in patients.
Conclusions: The findings and infrastructure from the WGSPD and NNN projects can help support initiatives that aim to promote networking among neuropsychologists internationally, help develop shared standards for acquiring NP data that measure common constructs across diverse populations and promote greater efficiency and thus access to advanced NP methods. These goals are further being explored by a new INS special interest group: Worldwide Initiative for Neuropsychological Data Sharing (WINDS), which aims to facilitate global integration of NP research and practice.

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2 Towards an internationally-adapted new assessment of rapid forgetting for possible early detection of dementia

Ashok Jansari[1] , Terry McGibbon[1] , Jwala Narayanan[2] , Ernest Tyberski[3] , Claudia Pulcini[1] , Chebat Andrea[1]

[1]Goldsmiths, University of London, UK
[2]Manipal Hospitals, Bangalore, India
[3]Pomeranian Medical University in Szczecin, Poland

Objective: Thanks to improved healthcare, globally, the population is ageing. With this positive improvement however, there is also a parallel increase in prevalence of dementia; in 2015 estimates suggested that 46 million people were living with dementia and this is predicted to increase to 75 million by 2030 and then 131 million by 2050. Worryingly, the increase in rates of dementia is not uniform with low and middle-income countries predicted to have accelerated rates of diagnoses. Given the huge costs related to dementia diagnosis and care, this is a global pandemic that needs attention. While physical treatment of dementia is not yet possible, earlier diagnosis could be used to provide cognitive support to lessen the burden of illness. The Verbal Associative Learning & Memory Task (VALMT, Jansari & McGibbon, 2022) has been shown to be sensitive for detecting otherwise healthy older adults who complain of everyday memory problems but who pass standard tasks such as the Wechsler Logical Memory subtest. The aim of this study was to adapt and translate VALMT into a number of different languages and to then evaluate efficacy of the translations.
Participants and Methods: VALMT involves a phase of learning unrelated word pairs (e.g. TROOP-SHAWL) to a set criterion and then being tested with cued recall (e.g. TROOP-???) 55 minutes and 24 hours later. The word pairs and all instructions were translated into Polish, Italian and French; further, the word pairs were adapted to those that are used by English-speakers in India. The study was run online with a dedicated webpage for each language; any individual over 18 years of age could participate with data collection ongoing (currently UK N=105, Indian N=136 Polish N=107 & Italian N= 60). French
Results: For a comparison of age groups, data for participants under 30 years of age was isolated into a Younger group and that for participants over 55 was isolated into an Older group. English VALMT is able to differentiate between the Younger and Older participants ($F(1, 58) = 13.72$, $p < .001$, $h_p^2 = 0.19$) further, by separating the latter group into those who

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learned to criterion rapidly and those who learned slowly, it is found that Slow Older learners forgot much more rapidly compared to their Fast Older age-matched controls who did not show much difference to the Younger group ($F(3.1, 88.9) = 21.52$, $p < .001$, $h_p^2 = 0.43$). The age effect so far is also replicated in Indian English, Polish Italian and French.
Conclusions: Our findings suggest that the VALMT has potential for detecting rapid forgetting in otherwise healthy ageing populations to identify those at risk of developing dementia at earlier time points than is currently possible; additionally, it translates well to other languages. Such findings could have important implications in terms of providing early support for such individuals or for highlighting the negative impact of repeated head injuries to the sporting world. Currently data collection is underway in Turkish and Norwegian whilst translations of VALMT into Spanish and Thai are being completed.

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3 Moroccan Arabic Norms for Name Agreement, Frequency, Imageability, Visual Complexity, and Age of Acquisition

Youssef Rami[1] , Samir Diouny[2] , Mohamed Yeou[1] , Najib Kissani[3]

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[2]Clinical Neuroscience & Mental Health, Hassan II University, Faculty of dentistry, Casablanca, Morocco
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Introduction: The object and action naming battery (OANB) (Druks & Masterson, 2000) is widely used for psycholinguistic research, aphasia research, and clinical practice.
Objective: The present study aimed to culturally and linguistically adapt the OANB for Moroccan speakers and collect the psycholinguistic properties, familiarity, imageability, visual complexity, and age of acquisition, which have been shown to influence naming performance in aphasics and healthy individuals.
Participants and Methods: Forty healthy Moroccan Arabic-speaking individuals were recruited to collect name agreement values for 100 line drawings of actions and 162 line drawings of objects. This was followed by collecting data for the psycholinguistic variables: spoken-word frequency, imageability, visual complexity, and age of acquisition.
Results: 68% of the verbs and 77% of the nouns received 100% target responses. A minimum of 93 percent name agreement was reached for the remaining items. The Moroccan Arabic OANB (MA-OANB) consists of 70 objects and 60 action pictures. Norms were also collected for the following psycholinguistic variables: spoken-word frequency, imageability, age of acquisition, and visual complexity.
Conclusion: The MA-OANB can be used in various psycholinguistic investigations and clinical population evaluation and remediation in Morocco.
Keywords: Moroccan norms, naming, psycholinguistic variables, object and action

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4 Cognitive Constructs: Age and Education Effects

Shinta Estri Wahyuningrum[1,4] , Augustina Sulastri[2] , Indonesian NP Consortium [5] , Gilles van Luijtelaar[1] , Marc P. Hendriks[1,3]

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[2]Faculty of Psychology of Soegijapranata Catholic University, Semarang, Indonesia
[3]Academic Centre for Epileptology (ACE), Kempenhaeghe, Heeze, The Netherlands
[4]Faculty of Computer Science of Soegijapranata Catholic University, Semarang, Indonesia
[5]Indonesian Neuropsychological Test Consortium

Objective: In Indonesia, there is a lack of standardized neuropsychological tests, which hampers their use in clinical practice. Recently, an Indonesian Neuropsychological Consortium has initiated the adaptation of ten internationally commonly used tests (Digit Span, Rey-Auditory Verbal Learning, Boston Naming, Five Point, Trail Making, Verbal Fluency, Stroop, Figural Reproduction, Bourdon, and Token) for use in Indonesia. Here, we report the analyses of the psychometric properties, including preliminary normative data, the reliability, the underlying cognitive constructs, and the effects of age and education on these constructs as validity indicators.
Participants and Methods: Four hundred and ninety healthy adults living on Java Island participated in this study, and all subjects completed all tests. Age range varied from 16-80 years of age, and their degree of education varied from elementary school to doctoral. The test-retest reliability was determined in a parallel study with fifty participants. The underlying cognitive constructs were assessed with Principal Component Analysis (PCA), and

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multifactor ANOVA's characterized the demographic factors age and education.
Results: Mean scores, standard deviation, and percentile scores of 33 variables of the tests were calculated. Medium to strong test-retest correlations was found in nine tests, varying from 0.44 - 0.88. PCA revealed eight constructs that accounted for 66.80% of the total variance. Analysis of Variance (ANOVA) showed significant effects of age on six constructs (i.e., speed of visuospatial information processing, auditory-verbal working memory, verbal naming and language comprehension, selective attention and inhibitory control, and verbal learning ability). Age effects were not found for language production and verbal short and long-term memory. Furthermore, all constructs showed effects of education, except for verbal short and long-term memory.
Conclusion: We conclude that all test scores were in good agreement with what is internationally reported. The psychometric analyses showed objectives concerning reliability and validity and are considered promising. Interestingly, as expected, not all constructs showed the same age-dependent decline and a somewhat unique by an age-affected pattern for each of the cognitive constructs. It is hoped that the Indonesian Neuropsychological Test Battery can be used for the Indonesian population in the near future, and the preliminary normative data reported may enhance the use of the tests in the future. The large ethnic and linguistic diversity of Indonesia is a challenge for more definite normative scores. However, in the meantime, the tests are not yet available for clinical use until the development of normative scores and validation in the clinical setting are done.

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5 Identifying Educational and Literacy Biases in Neuropsychological Assessments: A Systematic Review

Dawn Higgins[1] , Unai Diaz-Orueta[1]

[1]Maynooth University

Objective: Current cognitive screening tools for dementia require high literacy and educational levels to be completed. This is inappropriate for populations with low overall levels of literacy and/or education as it is one cause of false positives (where a cognitively intact individual is wrongly diagnosed with dementia). Several studies have demonstrated that poor educational attainment leads to inaccurate results using traditional assessment measures (Klekociuk, Summers, Vickers, & Summers, 2014; Ranson, Kuźma, Hamilton, Muniz-Terrera, Langa, & Llewellyn, 2019). Therefore, the aim of this research was to review all currently used cognitive screening tools for dementia and identify which deficits are being measured by the tasks included in the tools in an effort to understand which components of the tools contain educational or literacy biases. This also identified gaps in any cognitive domains not currently being assessed.
Participants and Methods: Guided by PRISMA-P, this review searched for all articles between 2006 and 2021 using electronic databases such as such as PsycInfo, Embase, Scopus and PubMed, as well as grey literature databases EThOS, Dart-Europe and Rian to identify articles which focus on existing assessments, with results being used to clarify which tasks contain any such biases. A total of 90 articles were included following refinement. Additionally, further searches of conventional search engines such as Google scholar were then conducted in an effort to identify any commonly used English language dementia screenings and assessments which had not been captured within the articles to ensure a complete dataset. A total of 95 assessments were detected.
Results: This review has yielded several noteworthy results with regard to the implicit biases present in neuropsychological testing. Specifically, educational and literacy biases were found to be present within components of all the most commonly used assessments, including but not limited to the MoCA, the RUDAS, and the ACE III. Written components and components requiring high levels of linguistic fluency or mental arithmetic to complete were found to be the most biased. Furthermore, several gaps were found in cognitive domains not currently assessed within the cognitive screening tools, for example executive function is not assessed in the RUDAS, and visual memory is not assessed in any of the screening tools included in the study.
Conclusion: This review has identified and explored factors which may impact the efficacy of standard neuropsychological testing when used with certain marginalised populations. These results echo those from a recent review of the RUDAS which found that adjusting scores according to education level significantly improved the accuracy of the assessment (Nielsen et al., 2019) despite one of the supposed advantages of the RUDAS being its lack of bias in individuals with a lack of formal education (Nielsen, 2020), and contribute to an explanation as to why no screening tool has been validated for use with populations of low literacy (Paddick et al., 2017). Therefore, following on from this review, the next stage of this research aims to create and validate a

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suitable cognitive assessment protocol for dementia for use within a population of low literacy.

Coffee Break

15:30- 16:00h
Wednesday, July 6, 2022

Poster Session 01

15:30- 16:00h
Wednesday, July 6, 2022

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1 Association Between Perceived Injustice and Psychological Outcome in a Litigating, Mixed-Severity TBI Sample

Mitchell Byrne[1] , Jennifer Batchelor[1] , Nicholas W. G. Murray[1] , Susanne Meares[1] , E. Arthur Shores[1] , Joanne M. Bennett[2]

[1]Department of Psychology, Macquarie University, NSW Australia
[2]School of Behavioural and Health Sciences, Australian Catholic University, NSW Australia

Objective: Perceived injustice describes the feeling that one has been treated unfairly following a wrong – such as physical injury. It has been strongly associated with poor functional and psychological outcomes following traumatic brain injury (TBI), particularly in those undergoing litigation. To date, studies have only investigated this relationship in a mild TBI sample, and no study has investigated the relationship with anxiety. The current study aims to investigate the association between perceived injustice and psychological outcomes (including anxiety) in a litigating, non-malingering, mixed-severity TBI sample.
Participants and Methods: Fifty-three consecutive participants (male *%* = 67.9) were recruited from a private medicolegal neuropsychology practice. All participants were assessed in the context of claims for damages relating to TBI. These include associated orthopedic injuries and psychiatric disorders. All participants were over the age of 18 years at the time of sustaining their TBI (*M* = 38.58; *SD* = 15.33) and had sustained a TBI at least two years prior to assessment (time since injury *M* = 3.71; *SD* = 1.90 in years; TBI severity; mild = 43.40%, mild-complicated = 7.55%, moderate = 15.09%, severe/extremely severe = 33.96%). Participants generally reported completing high school (number of years *M* = 12.51; *SD* = 2.77). Each participant completed a comprehensive neuropsychological assessment including questionnaires relating to perceived injustice (Injustice Experience Questionnaire severity/irreparability subscale and blame/unfairness subscale), postconcussion symptom reporting, depression, anxiety, stress, posttraumatic stress symptoms, and pain both at the time of assessment and over the preceding 24 hours. The association between perceived injustice and the above factors was investigated using seven hierarchical regressions, controlling for relevant demographic factors (age, education, TBI severity, time since TBI, and previous psychiatric diagnosis).
Results: Perceived injustice was significantly elevated in our sample and was strongly associated with all psychological factors (postconcussion symptom reporting, depression, anxiety, stress, posttraumatic stress symptoms, and pain), over and above demographic factors. The severity/irreparability subscale of the perceived injustice scale was a stronger predictor of depression and anxiety symptoms than the blame/unfairness subscale. Overall perceived injustice and psychological symptom reporting was significantly elevated in our sample compared to non-litigating samples.
Conclusions: The current study further supports the existence of a strong association between perceived injustice and psychological factors in a novel population (mixed-severity, litigating TBI). In addition, our study was the first to examine the influence of perceived injustice on anxiety symptom reporting, demonstrating a strong relationship – particularly with the severity/irreparability subscale of the perceived injustice scale. Future research should continue to investigate perceived injustice in TBI populations, particularly how it could relate to other measures of outcome, such as functional or cognitive outcome. Perceived injustice may influence the development of psychiatric/psychological symptoms following TBI. Clinicians and researchers should be aware of this association and routinely assess for feelings of perceived injustice – particularly in litigating samples, as improving feelings of injustice may contribute to significant improvement in psychological outcome.

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2 Predicting TOMM Performance in a Sample of American War Veterans

Sofía López-Vallejo[1,2] , Hinza Batool Malik[3] , Kayla Blaire Miller[4] , Carlos Burneo-Garcés[5] , Antonio E. Puente[3]

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Background: The Test of Memory Malingering (TOMM; Tombaugh, 1996) has been widely used to identify the presence of malingering in specific cognitive symptoms in different populations (Martin et al., 2020; Wisdom et al., 2012). However, the unequivocal diagnosis of malingering requires a set of indicators of this tendency during the neuropsychological evaluation (Bush et al., 2014; Egeland, & Langfjæran, 2007; Weber et al., 2018).
Objective: Thus, the objective of this study was to identify the best predictors of TOMM performance from a set of cognitive measures in order to propose a model that helps the accurate diagnosis of malingering of symptoms related to memory problems in a sample of American war veterans.
Participants and Methods: A sample of 356 male veterans aged 19-56 years (M = 26.97, SD = 6.431) was assessed using the TOMM, the Trail Making Test (TMT; Reitan, & Wolfson, 1993), the Stroop test (Golden, 1978), the four memory indices of the Wechsler Memory Scale (WMS-IV; Wechsler, 2008), and the ten principal subtests of Wechsler Adult Intelligence Scale (WAIS-IV; Wechsler, Wechsler, et al., 2008): Similarity, Vocabulary, Information, Block design, Matrix reasoning, Visual puzzles, Digit span, Arithmetic, Symbol search, and Coding. Significant correlations ($p<.001$) equal to or greater than $r = .300$ between all the variables studied were selected. Line regression analyses were calculated to estimate the percentage of variance explained individually and jointly for these variables, considering Trail 2 of the TOMM as the outcome measure.
Results: After examining all possible linear regression models, the most parsimonious model that explains the largest percentage of the variance ($R^2 = .266$) include four variables: Delay memory index scale of WSM-IV: F (1, 351) = 65.468, $p<.001$, $R^2 = .157$; Digit span subscale: F (2, 350) = 48.75, $p<.001$, $R^2 = .218$; Stroop Color of Stroop Test F (3, 349) = 38.788, $p<.001$, $R^2 = .250$, and Trail A Time at TMT, F (4, 348) = 31.540 $p<.001$, $R^2 = .266$.
Conclusions: The results suggest a useful predictive model contrasting the examinee's TOMM performance.

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3 When Things are not what they seem: Delusional Misidentification Syndromes in a Sample of Patients with ABI

David De Noreña[1,2] , Juan Pablo Romero[1,3] , Ana Bravo[1] , Marcos Ríos-Lago[1,4]

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Objective: Delusional misidentification syndromes (DMS) are a set of infrequent and shocking alterations that imply a false and stable belief about people, body parts and places, and in which the feeling of familiarity with them is altered. In acquired brain damage (ABI), they are usually associated with right hemispheric lesions, although the neurocognitive characteristics of the disorder are still poorly defined. The aim of this study is to characterize a sample of patients with ABI and DMS, describing laterality and location of the lesion, type of syndrome, as well as the presence of other neuropsychological impairments.
Participants and Methods: A sample of 23 inpatients admitted to a rehabilitation service who presented these symptoms were studied. Type of syndrome, laterality and location of lesions, as well as the presence or absence of neglect and/or memory disorders were described.
Results: As in most studies, all patients presented right hemispheric lesions, with bilateral lesions in approximately 30% of the sample. 35% showed frontal lesions, temporal and parietal lesions also being frequent. Most frequent delusions were place delusions (reduplicative paramnesia), followed by person delusions (Fregoli and Capgras). Practically all patients showed memory problems (87%) and 65% of them, neglect.
Conclusions: DMS are pathognomonic of right hemispheric lesions and are usually associated with severe neuropsychological disorders. The study of these rare disorders is necessary due to their impact, their importance to understand the functions of the right hemisphere in familiarity and reality monitoring, as well as for the adequate design of intervention plans.

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4 Spontaneous Memory Strategy Use in Acquired Brain Injury: the Role of Memory Functioning and Cognitive Reserve

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Objective: Acquired brain injury (ABI) often results in a wide range of cognitive impairments. Memory problems are among the most common and have a significant impact on daily life functioning. Neuropsychological rehabilitation consists of interventions aimed at compensating for these memory impairments by using internal (e.g., mental rehearsal, visualization) and external (e.g., memory aids: notebook, alarm) compensation strategies. However, little is known about spontaneous strategy use (i.e. without treatment) and its determinants. This study examines the influence of memory complaints, memory performance and cognitive reserve on memory strategy use in daily life after ABI.
Participants and Methods: A total of 60 adults (mean age 51 years, range: 27-71) with ABI (³ 3 months post-injury) were included at the start of their rehabilitation program. Receiving any form of cognitive training in the past was an exclusion criterion. Spontaneous strategy use in daily life was measured using the strategy scale of the Metamemory in Adulthood Questionnaire (MIA). Memory complaints were assessed with the Everyday Memory Questionnaire-revised (EMQ-R) and memory performance with the Auditory Memory Index (AMI) of the Wechsler Memory Scale-fourth edition (WMS-IV). Proxies for cognitive reserve were education level and an IQ-estimation based on two subtests (Vocabulary and Block Design) of the Wechsler Adult Intelligence Scale-fourth edition (WAIS-IV).

Results: Education level (β=.34, *p*=.004) and memory complaints (β=.33, *p*=.005) were significant predictors of self-reported strategy use. A higher education level and more memory complaints were related to using more memory strategies in daily life. When examining the internal and external strategy subscale of the MIA separately, these significant predictors were only found for external strategy use. Estimated-IQ (β=.01, *p*=.945) and memory performance (β=-.13, *p*=.322) were not related to self-reported strategy use in daily life.

Conclusions: The spontaneous use of memory strategies in people with ABI is related to education level and memory complaints, but not to objective memory impairment. Possibly, the burden of experiencing memory complaints in daily life drives people to compensate for their memory problems, whereas a better cognitive reserve enables people to use (effective) memory strategies. Neuropsychologists should take spontaneous strategy use into account when providing memory strategy training to people with ABI.

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5 Intensive Treatment in Patients with Chronic Stroke to Increase the Acceptance and use of the Affected Arm

Belén Laureano Rico[1] , María Navarro Miras[1] , María del Carmen Martínez Cortés[1] , Velasco Collado Yael Nelea [1] , Jonathan Ladson[2]

[1]Centro de Evaluación y Rehabilitación Neuropsicológica. CerNep. Universidad de Almería. España.
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Objective: To present the results of a single-case intensive intervention, based on Constraint-Induced Movement Therapy (CIMT) and Acceptance and Commitment Therapy (ACT), to explore the interventions efficacy around the acceptance and improved functionality of an affected upper limb post stroke.
Participants and Methods: Participant: A 60-year-old stroke survivor who has been living with right-sided hemiparesis and the subsequent refusal to acknowledge or attempt to actively use the affected upper limb since the event in 2016. Materials: A pre-post intervention evaluation of the psychological processes of inflexibility (AAQ-II), cognitive fusion (BAFT) and an adaptation of the BAFT questionnaire, to include specific content about the upper limb (BAFT-A), were completed. In addition, the Fugl-Meyer scale was used to measure motor function in the affected upper limb and the number of task repetitions, per minute, were recorded. Procedure: 40 hours of intervention-12 hours of physiotherapy; 6 hours of ACT psychotherapy and 22 hours of exercise training.
Results: The results detailed an improvement in psychological flexibility (AAQ-II 29/26), a reduction in cognitive fusion with private events (BAFT 66/52) and a reduction of limiting thoughts around the affected upper limb (BAFT-A 42/25), while improved motor function was identified in the wrist and hand (Fugl-Meyer

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45/49) and an increase in task repetitions per minute was also recorded.
Conclusions: The single-case intensive intervention highlights how the multimodal approach, incorporating the use of ACT and CIMT, was an effective intervention for the improved functionality and acceptance of the affected upper limb for an individual in chronic stroke recovery.

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6 Cognitive Complaints and Cognitive Impairments in Elderly Patients with mild Traumatic Brain Injury

N. S. Thuss[1,2] , S. E. Rakers[1,2] , J. M. Spikman[1,2] , J. van der Naalt[2]

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Objective: Mild traumatic brain injury (mTBI) generally has a good prognosis, but subjective cognitive complaints are common in the (sub)acute phase after injury. Also, objective cognitive impairments in information processing speed, attention and memory can be present in this (sub)acute phase after injury. There is a lack of knowledge with regard to the cognitive status in elderly mTBI patients. Given the rapidly aging population, more elderly will encounter mTBI, which emphasizes the need to investigate this patient group more thoroughly.
We aimed to examine the cognitive complaints, cognitive impairments and their relationship in elderly mTBI patients.
Participants and Methods: A total of 50 mTBI patients aged 61 to 88 years (M = 71.9, SD = 6.9) at the time of injury and 42 healthy controls aged 60 to 80 years (M = 67.3, SD = 4.8) participated in the current study. The groups were controlled for sex and education level. The Head Injury Symptom Checklist (HISC) was administered to measure cognitive complaints (forgetfulness, concentration problems, slowness). Cognitive functions were measured only in patients by administering a neuropsychological test battery at a mean of 17 weeks post injury (SD = 4.4, range = 9-29). The following cognitive domains were assessed: verbal memory, working memory, attention, information processing speed, executive functions and language. The percentile scores on the neuropsychological tests were compared to a median of 50.
Results: Results showed that mTBI patients experienced more often complaints of forgetfulness (p = .005) concentration problems (p = .041) and slowness (p = .002) than controls. Additionally, mTBI patients presented with a significantly reduced performance on several domains: verbal memory, executive functions and language. A significant, moderate negative correlation was found between complaints of concentration and a test in the domain of executive functions (Rs = -.411, p = .005).
Conclusions: These findings show that elderly patients experience persistent cognitive complaints and have cognitive impairment in several domains after suffering from mTBI. Increased complaints of concentration are associated with decreased performance in the domain of executive functions. In contrast, this relationship is lacking between complaints of forgetfulness and tasks in the domain of memory. This is remarkable, as it indicates a discrepancy between subjective and objective measures of cognition in this patient group. Hence, it is plausible that other factors are involved, which should be further explored.

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7 Case Study - Frontotemporal Lobe Impact During Boulder Detonation

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[1] BYU

Objective: Cerebral trauma to the frontal and temporal lobe region has been hypothesized to mediate many of the cognitive and behavioral deficits in acquired brain injury, as mediated by the localization of the anterior and cranial fossa (Bigler, 2007).
Participants and Methods: A 31-year-old White male with no premorbid neuropsychological history suffered subdural and subarachnoid hemorrhage and extensive facial/orbital trauma, including orbital enucleation, when engaged in boulder blasting. At 16-months post injury, patient completed a neurological battery with this examiner that including the following: WAIS-IV, D-KEFS, CTMT, RAVLT, BNT, GPT, and PAI.
Results: Patient met DSM-5 criteria for mild neurocognitive disorder (G31.84), major depressive disorder, recurrent, moderate severity (F33.1), and generalized anxiety disorder (F41.1). Core deficits detected on CTMT (1st percentile), D-KEFS, CWIT (9th/4th percentile on interference tasks), proactive interference on RAVLT (List B = 0.1st percentile), with pronounced depression (T=74) and suicide risk (T=74), as well as anxiety (T=70) detected on the PAI (no evidence of malingering). Patient

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remains unemployed, is unable to concentrate/ problem solve, and suffers profound proactive interference and affective symptoms (e.g., despair and anxiety) on a daily basis.
Conclusions: Despite the depth and breadth of occupational and neurological treatments completed to date, as well as the use of compensatory strategies, patient continues to manifest significant neuropsychological deficits. Such outcomes reinforce the fragility of the frontal and temporal brain regions in TBI's. Discussion of practical options to maximize safety of these brain regions in high-risk vocations, as well as cognitive and physical remediation techniques, are discussed.

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8 Enriched Music-Supported Therapy in the Rehabilitation of Patients with Chronic Stroke

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Objective: Most patients with stroke do not achieve full recovery of upper limb motor functions after completing formal rehabilitation programs. Music-supported Therapy (MST) is an effective intervention to improve motor functionality and quality of life post stroke. We designed an enriched version of Music-supported Therapy (eMST) adapting it for home use, adding music therapy group sessions, and increasing training intensity and variability. The eMST aims to improve fine and gross motor functions of the affected upper limb through musical training. We developed an app for electronic tablets to conduct the rehabilitation sessions at home with a MIDI-piano and percussion instruments. In this way, we intended to provide patients with chronic stroke the opportunity of continuing rehabilitation by themselves. Combining self-training and group sessions promote autonomy, motivation, and reintegration into community life, which are crucial elements for motor recovery.
Participants and Methods: A randomised controlled trial was conducted to test the effectiveness of the eMST in improving motor functions and quality of life of chronic stroke patients when compared to the home-based motor intervention called Graded Repetitive Arm Supplementary Program (GRASP). Thirty-five patients were recruited and randomly allocated to the eMST group or the control group, both consisting of a 10-week home-based rehabilitation program of 4 one-hour sessions per week with tele-monitoring and phone calls. Upper limb motor functions and quality of life were evaluated pre- and post-intervention as well as at 3-month follow-up.
Results: Patients from both groups clinically improved in upper limb motor functions post-intervention. Patients undergoing the eMST intervention demonstrated enhanced quality of life when compared to patients undergoing the conventional intervention.
Conclusions: The eMST showed to be an effective home-based musical intervention in improving not only upper limb motor functions but also quality of life of patients with chronic stroke. This novel intervention can have both a medical and a social impact, trying to avoid a worrying health problem in people who face daily living limitations in personal, social, and work activities.

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9 CMSE: The Applicability of a Neuropsychological Screening Tool for Patients with Acute TBI.

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Objective: MMSE (1975, Folstein) has been shown to be relatively insensitive cognitive screening tool in patients with Traumatic Brain Injury (TBI). MMSE-Chinese Version (MMSE-C) and Screening Test for the Luria-Nebraska Neuropsychological Battery in Taiwan (ST-LNNB) are commonly used cognitive screening tests in clinical practice in Taiwan. Community Mental Status Examination (CMSE) is a brief and easily administrable test for global assessment of cognitive function. This screening tool uses various verbal and nonverbal tasks, including naming, comprehensive, classification, tactile integration, graphic construction and memory, to assess everyday cognitive function. The purpose of this study was to compare the test sensitivity and applicability of CMSE, MMSE-C and ST-LNNB to cognitive impairment following TBI.
Participants and Methods: This was a retrospective study analysing the medical record of TBI patients from a medical centre at Southern Taiwan from 2010 to 2021. A total of 82 inpatients with TBI were referred to Clinical Neuropsychologist for medical care to receive CMSE, MMSE-C, ST-LNNB when Glasgow Coma Scale (GCS) is scored above 8. MMSE-C was developed in 1988 with 33-point questionnaire. Both MMSE-C and ST-LNNB have the norm of Taiwanese population and cut-off points. Additionally, we compared the 64 inpatients with TBI amongst with the severest injury during their stay in emergency and ward. The patients were divided into severe group (GCS score of 3-8) and mild to moderate group (GCS score of 9-15). This is to analyse the probability of deficits by the screening tests.
Results: 1) A total of 75 TBI patients (91.5%) demonstrated a cognitive impairment in CMSE. However, only 61 patients (74.4%) showed an impairment in ST-LNNB, and 43 patients (52.4%) in MMSE-C. Forty-three patients with TBI who were determined to be cognitive impaired by MMSE-C were detected by CMSE simultaneously. However, only 41 patients (95.3%) amongst were detected by ST-LNNB. 2) Concerning the TBI severity, 45 patients (95.7%) out of 47 who suffered severe TBI were determined to be cognitive impaired by CMSE, while ST-LNNB only recognized 37 patients (78.7%), and 27 patients (57.4%) for MMSE-C. Seventeen patients suffered mild to moderate TBI, 14 patients (82.4%) showed an impairment in CMSE and 12 patients (70.6%) in ST-LNNB, whereas only 7 patients (41.2%) were recognized cognitive impairment by MMSE-C. 3) Thirty patients with TBI (out of 64) scored above the upper cutoff (>25) during the period of transferring from ER to ward. More specifically, MMSE-C failed to detect almost half of the cognitively impaired TBI inpatients in the acute stage (GCS mean score=6.2, SD=3.67).
Conclusions: CMSE is a useful and sensitive screening tool for the assessment of global cognitive function in patients with acute TBI, compared to ST-LNNB and MMSE-C. Furthermore, 50% patients have severe injury (lowest GCS score up to 3) among those patients who were unable to detect the impairment by MMSE-C. It can result in false-negative findings in acute TBI determination. Finally, we highly recommend adopting the CMSE in clinical setting to improve the detection accuracy for cognitive impairment.

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10 Reduced Physical Activity in Paediatric Brain Injury and Neurological Conditions

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Objective: Engagement in physical activity holds potential wide-ranging benefits for paediatric neurology populations. These include benefits for physical and mental health, as well as social enrichment. However, preliminary

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research suggests children living with acquired brain injury or chronic neurological conditions have lower levels of physical activity in comparison with healthy age-matched peers. This study investigated physical activity levels in a paediatric neurology sample within a UK tertiary neurosciences centre.
Participant and Methods: A retrospective analysis of 105 (41 female: 64 male) patient datasets over an 18 year period was undertaken. The activity and social competence subscales of the Child Behaviour Checklist 6-18 (CBCL) were used to evaluate physical activity in relation to age-matched peers. Patients were aged between 6 years 0 months and 16 years 11 months (mean age 10.31 years, SD 2.84 years) and had been formally diagnosed with a neurological condition. Patients were compared as a whole sample and across condition type (Group 1 = Acquired Brain Injury; Group 2 = Epilepsy; Group 3 = Other Neurological Condition) with normative data sets.
Results: Statistical analysis showed reduced activity levels in all three groups compared with the normative sample ($p<0.001$). There was a greater proportion of defined "clinical inactivity" in the neurological group (42%) compared with normative data sets (7%, $p<0.001$). No difference in physical activity levels was found for different neurological groups ($p>0.05$). Activity levels demonstrated a significant ($p<0.001$), positive correlation ($r=0.49$) with social competency.
Conclusion: These findings support previous evidence that physical activity is reduced in acquired brain injury and other neurological populations. This is important in the consideration of the management of such populations. There may be substantial benefits from engagement in physical activity. Future research is warranted to better understand the causal factors of inactivity. Further work should also consider the effectiveness of interventions that target inactivity to improve physical, mental and social functioning in this population.

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11 A Case Report of Long-Term Effects of Delayed Post-Hypoxic Leukoencephalopathy (DPHL) Following Drug Overdose

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Objective: We report neuropsychological testing data for a 39-year-old right-handed white female who developed delayed post-hypoxic leukoencephalopathy (DPHL), a rare demyelinating syndrome, following an anoxic brain injury due to an overdose from benzodiazepines a decade prior.
Participants and Methods: An extensive record review documenting her medical timeline and treatment over the last decade was conducted using the available EMR system, which also included both EEG and neuroimaging data. A comprehensive neuropsychological battery was administered with corrected normative data for age, race, education, and other demographic factors when available. Collected data was compared with other case reports of DPHL.
Results: Similarities and differences between this case and previously reported cases, including timeline of deterioration and neuropsychiatric concerns, are analyzed. Lasting deficits measured by neuropsychological test performance is interpreted and discussed.
Conclusion: DPHL is a rare disease process which is not fully understood. Current theories are discussed as well as neuropsychological sequelae. Current data is compared with previous case reports.

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12 Neural Correlates of Impaired Self-Awareness of Deficits after Acquired Brain Injury: a Systematic Review

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Objective: Self-awareness is essential for the process and outcome of rehabilitation but is often affected by acquired brain injury (ABI). While many studies investigated the psychological aspects of self-awareness deficits, the biological underpinnings are not well

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understood. The aim of this review was to identify the neural correlates of self-awareness after ABI.
Participants and Methods: The literature was systematically reviewed according to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRSIMA-P) guidelines. Search terms were always terms relating to self-awareness combined with terms relating to imaging techniques and terms relating to brain injury. Eventually, eight studies were included in this review. According to the quality assessment, one was of poor quality, one of fair quality, and the other six were of good quality.
Results: There are different levels of self-awareness that can be measured in different ways. Results indicate that anticipation of future problems is associated with lesions and decreased neural functioning in the right frontal lobe, as well as increased diffusivity throughout the white matter of the brain. Poor behavioral adjustment on implicit awareness tasks is associated with less functional connectivity of anterior cingulate cortex and right or middle inferior frontal gyri to the fronto-parietal control network, as well as more activation in the left insula and left parietal operculum during error processing. Recognition of mistakes is associated with internetwork connectivity of anterior or posterior default mode network to salience network.
Conclusions: After ABI, different results in brain activation and connectivity are found depending on level of awareness measured. Future studies are necessary to confirm these findings.

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13 The Many Faces of Stigma After Acquired Brain Injury: A Systematic Review

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Objective: Stigma to Acquired Brain Injury (ABI) has been described as a significant obstacle for community integration and emotional well-being. Despite its clinical relevance, the number of studies dedicated to stigma is still limited. The goal of this systematic review was to explore the existing literature and develop a model of stigma after brain injury that allows clinicians and researchers to capture the complexity of the phenomenon and guide interventions.
Participants and Methods: Three electronic databases were searched (Web of Science, Pubmed and PsycInfo) using the keywords: *Acquired Brain Injury*, *ABI*, *brain damage*, *brain injury*, *head injury, stigma, stigmatization* and *stigmatized.* Articles published between 2000 and 2021 were selected. Only articles that used quantitative, qualitative or mixed method designs, and explored stigma and associated concepts as a primary research outcome in adult ABI populations, were considered. Additionally, relevant papers were extracted from the reference section of two previous reviews. Information from selected articles was coded and analyzed in relation to three questions: 1) how is stigma defined?, 2) what theoretical frameworks are employed?, and 3) what are the main findings of stigma and ABI?
Results: A total of 27 articles were selected. Four types of stigma emerged in the ABI literature: self-stigma (n=5), stigma-by-association (n=2), public stigma (n=19) and implicit/explicit stigma (n=1). Overall, stigma was defined in terms of stereotypes, prejudices and discrimination, which can be shared by the public and internalized or challenged by ABI survivors and their families. All forms of stigma can manifest at implicit and explicit levels. Studies concerning self-stigma focused on understanding the decision to conceal or disclose having an ABI, and its effects on social relationships. Studies focusing on stigma-by-association described the experience of stigma among caregivers and assessing its relation with mental health outcomes. Studies related to public stigma explored how lack of knowledge contributes to the construction of stigma, and how the invisibility of ABI sequelae can influence the public's attributions and intended behaviors.
Conclusions: A model of stigma after ABI must consider the complexity of stigma at individual, family and public levels, as well as the bidirectional interactions that exist between these elements. Implicit and explicit information processing is a key element to consider in the comprehension of all forms of stigma, despite the little research that has focused on this issue. Since there is a lack of studies describing interventions targeting each type of stigma, research on this topic is urgently needed. Evidence from non-brain injury populations can be a useful tool to advance in the development of therapeutic interventions. Psychoeducation and group-based approaches, specifically, are

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two promising intervention modalities that have proven useful in treating stigma in other clinical groups. Neuropsychological rehabilitation should include stigma as an element that is routinely assessed and incorporated in therapeutic formulations.

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14 Failure to Falsify contributes to the Replication Crisis in the Clinical Neurosciences

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Objective: This work discusses evidence for the replication crisis in the clinical neuroscience literature with focus on the size of the literature and how scientific hypotheses are framed and tested. We aim to reinvigorate discussions born from philosophy of science regarding falsification (Popper, 1958) but with hope to bring pragmatic application that might give real leverage to attempts to address scientific reliability.
Participants and Methods: We describe an example from the network neurosciences in the study of traumatic brain injury where there has been little effort to test two prominent hypotheses leading to a literature without resolution.
Results: Based upon this example, we discuss how building strong hypotheses and efforts to falsify them can add precision to the clinical neurosciences.
Conclusions: With falsification as the goal, we can harness big data and computational power to identify the fitness of each theory to advance the clinical neurosciences.

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15 Establishing ground truth in TBI research: if replication is the answer, then what are the questions?

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Objective: For over a decade, investigators have been contending with concerns about reliability in science (i.e., "replication crisis") with reproducibility concerns observed in a range of disciplines including cancer research (Nosek et al., 2017;), economics (Camerer et al., 2016), and the clinical neurosciences (Gelman et al., 2017; Botvinik-Nezer et al., 2020; Kellmeyer 2017; Hillary & Medaglia, 2018). Given the current state of a rapidly growing TBI literature and concern about the reliability of many findings, the goal of this study is to sample from the TBI research community and track major trends that have shaped the TBI literature over the past 50 years (a search revealing >700,000 papers).

Participants and Methods: In order to understand the trajectory we first conduct decade by decade network analysis (1970-2019) to examine the emergence of scientific communities that shape this literature. To determine the reliability of these findings we using two search engines (Web of Science; Semantic Scholar). As a second goal, we sought to determine the most highly cited goals/hypotheses influencing the literature in each decade. We then identify influential hypotheses that have been directly tested with efforts to replicate original findings. Finally, to maximize transparency, we will provide a detailed procedure for the creation and analysis of our dataset, including a discussion of each of our major decision points, to facilitate similar efforts to replicate in TBI and in other areas of neuroscience.
Results: Efforts to replicate are on the rise but remain the rare minority (<10%). The hypothesis that modularity would increase over time was not supported -- modularity in scientific circles was less evident and work became more integrated over time. There has been movement from isolated animal models and human investigations of TBI to integrated efforts leveraging advancements in brain imaging, genetics, and immune functioning. We present the most influential hypotheses over the last several decades.
Conclusion: There needs to be greater effort dedicated to understanding the theories established and critical to our work as well as those promising hypotheses that require additional support. From a firmer foundation, TBI researchers may be better positioned to accelerate our science.

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16 Impaired Delayed Verbal Recall one week After Learning in Children After Mild Traumatic Brain Injury

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Objective: Although parents often report memory problems after mild traumatic brain injury (mTBI), there are mixed results regarding memory impairments in neuropsychological evaluations after pediatric mTBI. Recent evidence suggest that children after severe TBI may suffer accelerated long-term forgetting (ALF), an elevated memory loss over time that remains undetected on standardized neuropsychological memory tests that use only short delays. So far, there are no studies investigating whether children after mTBI suffer ALF. Thus, we investigated prospectively 1-week verbal recall after a mTBI and compared it to healthy controls.
Participants and Methods: We present preliminary cross-sectional data of a still ongoing longitudinal study with two time-points (one week (T1) as well as 3-6 months (T2) after mTBI), investigating verbal episodic memory performance. At T1, we included 64 children after mTBI (55% male; M_{age}=10.7 years (*SD*=2.1)) and 56 healthy controls (35% male; M_{age}=11.8 years (*SD*=2.4)) in the age between 8-16 years; at T2, we included data of 51 children after mTBI (57% male) and 39 healthy controls (39% male). The mTBI group was mild injured (GCS 13-15). Our experimental verbal memory test consisted of 17 words and participants learned the words over four learning runs; free recall was tested immediately, 30 minutes and 1-week after learning. While gender distribution and maternal years of education were similar between groups, there was a significant difference regarding age at both time-points. Additionally, children after mTBI were impaired in verbal learning performance. Thus, we controlled for age and learning in our analysis. We computed repeated measure ANCOVA's for T1 and T2 (Group x recall time-point (immediate-, 30-min-, 1-week recall)) to investigate recall performance over time.
Results: At T1 and T2, there were significant interaction effects between time and group (T1: $F(1.6,187.4)=12.1$, $p<.05$, $\eta^2=.01$; T2: ($F(1.6,138.7)=7.2$, $p<.01$, $\eta^2=.08$)) regarding verbal recall performance, meaning that children after mTBI recalled significantly less words 1-week after learning compared to healthy controls. At both time-points, recall performance immediately and 30-min after learning were comparable between groups.
Conclusion: Our data indicate that - at both time-points - recall performance 30-min after learning was comparable between children after mTBI and healthy controls. However, delayed verbal recall performance 1-week after learning was significantly reduced in children after mTBI. Thus, subtle impairments in memory consolidation could be a problem in children after mTBI that may be observed by parents as memory impairments in everyday life. Since memory loss over time is undetected using standardized memory tests, future studies should include delayed assessments of memory performance.

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17 Elevated neurobehavioral symptoms detected in subconcussive injuries in Spanish-speakers

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Objective: To examine whether individuals who have had exposure to high-risk scenarios (e.g. events requiring medical attention, high velocity force events), but who do not meet the criteria for TBI, differ from individuals with TBI or those who have never had any injury to the head or neck in their report of neurobehavioral symptoms.
Participants and Methods: This was a secondary data analysis conducted on the results from an online study to validate the Spanish version of the Ohio State University Traumatic Brain Injury Identification Method Self-Administered-Brief (OSU TBI-ID SAB) in an international sample of Spanish-speakers. Participants included 709 individuals between the ages of 18 through 65 from the continental U.S. (33.1%), Spain (12.3%), and Latin America (54.6%). An anonymous survey was distributed through online platforms and included the OSU TBI-ID SAB, which assesses lifetime exposure to Traumatic Brain Injury. The first five questions evaluate exposure to high-velocity force injuries and high-risk events requiring medical attention in the emergency room or hospital. The remainder of the questions evaluate the impact of those injuries on alteration of consciousness, thus allowing for determination of TBI. The sample was split into three groups: those who met criteria for history

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of TBI, those who never had an injury to the head or neck, and those who sustained subconcussive injuries (injuries to the head or neck without any alteration of consciousness). Also administered was the Neurobehavioral Symptom Inventory (NSI), a measure of symptoms commonly observed after head injury, with higher scores indicating more symptoms. Analysis of covariance (ANCOVA) was used to compare Groups on neurobehavioral symptoms as measured by the NSI, controlling for age, sex, drug and alcohol use, psychiatric treatment, and neurologic compromise.
Results: The NSI demonstrated a positively skewed distribution. A square root transformation improved normality. However, results did not differ substantially and the raw metric was utilized for ease of interpretation. A significant Group difference was found ($F(2,701)=14.8$, $p<0.001$). Pairwise comparisons revealed that individuals who sustained subconcussive injuries scored 2.8 points higher on the NSI relative to those who never had an injury to the head or neck (p=.006). Those with subconcussive injuries scored 3.1 points lower than individuals who met criteria for TBI (p=.001).
Conclusions: The Spanish OSU TBI-ID SAB is sensitive to differentiating subconcussive injuries in Spanish-speakers from both those with no head injury and those with TBI. These data also indicate that subconcussive-level impacts can be clinically important and result in enduring symptoms. Future research may evaluate the appropriateness and clinical utility of an OSU TBI-ID SAB index that quantifies the impact of subconcussive exposures on neurobehavioral function and other psychosocial outcomes.

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18 Effect of Cognitive Reserve on Attention and Processing Speed in Healthy Aging

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Objective: To predict the evolution of attention and processing speed (PS) in healthy aging and its relation with cognitive reserve (CR).
Participants and Methods: A cross-sectional study has been conducted and involved 250 cognitively healthy people from 40 to 89 years old (x=61,48; SD=12,64) grouped by age and gender. Four groups by age were created (G1: 40-50 years old (y/o); G2: 51-60 y/o; G3: 61-70 y/o; G4 > 71 y/o).
A score over 27 had to be obtained at the Mini-Mental State Examination (MMSE) (Folstein et al., 1975) to be included in the study. The total score and sub-index EDI of the d2-R Test of Attention (Brickenkamp, 2010) have been used to determine attention and PS during aging. The CR questionnaire (Rami et al., 2011) had also been facilitated.
Differences between age groups were analyzed with the Kruskal-Wallis H test, with a post-hoc comparison. An ANCOVA was also performed to study the effect of age after controlling cognitive reserve.
Results: The median scores showed statistically significant differences between groups, $\chi 2_{\text{d2-total}}(3) = 50.37$, $p < .001$; $\chi 2_{\text{EDI}}(3) = 60.72$, $p < .001$. Post-hoc analysis revealed significant differences in the total d2-R score between the group over 71 (MdnG4 = 98) and all other groups (MdnG1 = 132.5; MdnG2 = 130; MdnG3). = 115) ($p < .005$), as well as between the youngest and 61 and 70 y/o group ($p = .010$). Statistically significant differences were also obtained in the EDI sub-index for the group over 71 (MdnG4 = 110) and all other groups (MdnG1 = 147; MdnG2 = 145.5; MdnG3 = 132.5) ($p < .005$), as well as the youngest group and the 61-70 y/o group ($p = .004$). No other significant differences were detected.
After controlling the effect of cognitive reserve, there were also significant differences in both attention [$F(3, 132) = 13.65$, $p < .001$, $\eta 2$ partial = .237] and processing speed [$F(3, 132) = 15.43$, $p < .001$, $\eta 2$ partial = .259].
Post-hoc analyses indicate that the attentional performance is statistically better in the younger group compared to 61 to 70 years ($x_{dif} = 26.10$, $p = .002$) and over 71 ($x_{dif} = 38.94$, $p < .001$). The same effect was with participants between 51 and 60 y/o compared to those over 71 ($x_{dif} = 24.17$, $p < .001$).
The same effect has been described with PS. We found that is better in the younger group compared to 61 to 70 years ($x_{dif} = 26.80$, $p = .001$) and over 71 ($x_{dif} = 38.86$, $p < .001$), and with participants between 51 and 60 y/o compared to those over 71 ($x_{dif} = 24.91$, $p < .001$). No significant differences were observed after 61 years old.
Conclusions: Data obtained show that both attention and processing speed are gradually decreasing, as people get older. The results obtained through the analysis of covariance show a clear effect of cognitive reserve on performance in attentional capacity and processing speed from the age of 61, thus

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proving to be a protective element against the decline of these functions.

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19 Cognitive Changes in Healthy Older After Virtual Museums as Cognitive Stimulation Tool

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Objective: Cultural activities like attending museums, particularly the method "Museum object handling", exhibits enhance cognitive reserve and potentially prevent pathological aging improving subjective wellness and prevent cognitive decline and social isolation in older adults. The purpose of this was evaluated cognitive and emotional effects of a virtual museum object appreciation in a group of Mexicans healthy older adults.
Participants and Methods: Healthy older adults, 7 women and 3 men (age 62,9±6,3; education years16,8±2,8), were held in a groupal Zoom videoconference (1.30hrs once a week) during 11 sessions, in each virtual tour of museum a visualization of collection's objects were used as cognitive stimulation. Trained psychologists mediated the sessions guiding the appreciation of museum's objects from concrete characteristics until reaching conceptual symbolic traits, encouraging participants to share their experience and knowledge related to the museum object. All participants were evaluated with IQCODE and GDS online versions; cognitive performance was measured with MoCA and COGNIFIT. Computerized test COGNIFIT assess the following cognitive domains: sustained attention, processing speed, working memory, denomination and executive functions.
Results: Wilcoxon statistical test was performed. No statistically significant differences were found pre-post evaluation in GDS ($Z=-1.2$, $p=.22$) or MoCA total score ($Z=-1.25$, $p=.20$), but perceived cognitive impairment assessed with IQCODE increased after sessions ($Z=-2.19$, $p<0.05$). The computerized test COGNIFIT showed differences in memory score ($Z=-1.96$, $p<0.05$), working memory ($Z=-2.24$, $p<0.05$) and global cognitive profile ($Z=-2.02$, $p<0.05$), with better scores in the second evaluation.
Conclusions: Cognitive stimulation using museums' objects help healthy older adults to be more self-aware about their cognition. Increase score in memory tests were observed after virtual tour museum, supporting the idea that non-clinical community-based programs are useful for maintain psychosocial activities and decelerate cognitive impairment in the elderly.

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20 Loneliness: associated factors, predictors and risk groups. Poblational study..

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Introduction: Feeling Loneliness is a complex problem that is the subject of numerous interventions of all kinds: some specific and others, most of them, non-specific. It is important to find predictors and risk groups so that these interventions can effectively reach the target population.
Objectives: 1) To analyze health, lifestyle, and social factors associated with unwanted loneliness (SND). 2) To study the predictor variables of loneliness in the elderly and the risk groups that are established with these variables.
Participants and Methods: Madrid Health Survey. Cross-sectional population-based study. Telephone interview with a structured questionnaire. Representative population: randomly selected according to census taking into account district, age, and sex. Sample: 2060 people over 65 years of age; mean 76.26; SD: 6.19; range 65-98. The following were assessed: health, life habits, social aspects, mental health (Goldberg General Health Questionnaire-GHQ), and quality of life (COOP-Wonca), questions were asked about memory complaints and temporal orientation, the last ones were taken from the Mini Mental State Examination. We first performed a bivariate study using ANOVA and Chi^2; for the study of predictors, we performed Logistic Regression (with Odds ratio). The effect size was analyzed using Eta^2 and R^2. For the study of risk groups, we used the Decision Tree procedure.
Results: 9.24% feel lonely; 27.5% live alone and, of these, 19.7% feel alone; 5.3% feel alone despite living with others. There was a statistically significant association between feeling alone and mental health variables such as anxiety, depression, general mental health,

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and sleep quality; cognitive variables such as time orientation and memory complaints; sociodemographic variables such as age and sex; disease-related variables such as pain and opioid intake; variables related to impairment situations and living habits such as Having no one to turn to for help, or Having health problems that prevent him/her from taking care of one-self.
Predictors by effect size: Mental health, living alone, No one is concerned about the elder, Depression, Do not eat hot food more than two days a week, Having no one to turn to for help, Primary Education Level (Dependent variable "feeling alone" /Yes/No; Chi^2=411.14;p<0.0001; this model predicts 92.3 % of the participants; R^2 Nagelkerke:0.40).
We configure the highest risk groups with the variables: 1- Having poor mental health + suffering from depression regardless of other variables: 53.5% have SND; 2-Having poor mental health, without depression, but with low quality of life: 46.5% have SND. 3-Protection group: having good mental health + good quality of life + having someone concerned about the elderly, 1.6% feel loneliness.
Conclusions: The factors associated with unwanted loneliness are above all those related to health, especially mental health, and others that indicate situations of deficiency. We have found enormous differences between some groups and others. To be operative in the objectives of alleviating or reducing loneliness in the elderly, these results should be taken into account, especially those referring to predictors, risk, and protective groups. Moreover, actions should be aimed at improving individual and subjective factors, but also at strengthening links among peers and in the community itself.

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21 Lonliness in people with mild cognitive impairement: personality, cognitive performance and health

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Introduction: Unwanted Loneliness (UL) is a risk factor for cognitive impairment in older people, and is associated with an increased likelihood of onset of Mild Cognitive Impairment (MCI).

Objectives: To analyze between people with MCI and different degrees of perceived loneliness, the differences in objective variables (cognitive and functional performance), subjective variables (mood, perceived health), and personality traits.
Participants and Methods: Cross-sectional study. Non-probabilistic consecutive recruitment. Sample: 115 elderly patients with MCI. Sociodemographic characteristics: age (mean=77.54; SD=5.78); sex (52.2% women); school years (mean=10.81; SD=5.32). Assessment: cognitive performance (broad neuropsychological protocol), functionality (Pfeffer), frailty (Fried), emotion (GDS, Goldberg anxiety and depression test), perceived health (Nottingham), memory complaints (MFE), caregiver burden (Zarit), personality (NEO-FFI) and UL (ESTE-2 scale).
Results: The sample was subdivided according to the degree of loneliness: high (ESTE-2: 15-22 points), intermediate (ESTE-2: 7-14), low (ESTE-2: 0-6). We performed Analysis of Variance. Among individuals with different degree of UL, statistically significant differences were observed in the following variables (mean score in group with low-intermediate-high UL; p-significance; F-statistic):
-TMT-A (UL-low=88.05; UL-intermediate=90.62; UL-high=135; p=0.039; F=3.346);
-Boston naming test (UL-low=46.18; UL-intermediate=39.85; UL-high=36.39; p=0.02; F=3.977);
-GDS (UL-low=1.68; UL-intermediate=2.84; UL-high=4; p=0.05; F=3.070);
-Goldberg anxiety (UL-low=88.05; UL-intermediate=90.62; UL-high=135; p=0.039; F=4.956);
-Goldberg depression (UL-low=1.26; UL-intermediate=2.56; UL-high=3.69; p=0.006; F=5.378);
-Pfeffer (UL-low=1.50; UL-intermediate=0.50; UL-high=5; p=0.038; F=4.039);
-Nottingam (UL-low=3.44; UL-intermediate=7.40; UL-high=11.73; p=0.002; F=6.473);
-Neuroticism (UL-low=15; UL-intermediate=19.34; UL-high=23.38; p=0.000; F=9.746);
-Extraversion (UL-low=29.61; UL-intermediate=26.33; UL-high=23.84; p=0.007; F=5.250);
-Responsibility (UL-low=32.66; UL-intermediate=28.34; UL-high=27.23; p=0.008; F=5.025);
-Zarit (UL-low=7.83; UL-intermediate=11.82; UL-high=18.46; p=0.028; F=3.720);

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-Age (UL-low=76.32; UL-intermediate=77.14; UL-high=81.69; p=0.02; F=3.965).
Conclusions: People with higher UL show lower cognitive performance (processing speed and access to the lexicon), more functional impairments, worse mood, and worse perceived health. In addition, they show a personality profile characterized by higher neuroticism and lower responsibility and extraversion. Finally, they present greater fragility and a higher caregivers burden. These results allow us to define different MCI profiles according to the degree of UL and support the hypothesis of loneliness as a risk factor for poorer health among older people.

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22 A randomized controlled trial with the UMAM method of cognitive training

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Introduction: Different activities and programs are being used in an attempt to improve memory and cognitive performance in elderly people, and to diminish cognitive decline. These activities are referred to as "Cognitive Training" (CT) and they use different approaches: "paper and pencil" tasks, modeling or "role-playing" activities, computer programs, and even virtual reality. In Spain, the UMAM Method - Unidad de Memoria Ayuntamiento de Madrid-, widely used, has demonstrated its efficacy in previous studies. The best studied predictors of the benefits of cognitive interventions are age, level of education, and basal level of cognitive performance. However, the influence of the cognitive reserve (CR), the APOE genotype, and the volume of some brain regions on the effects of CT has been less well studied to date.
Objective: We aimed to analyze whether the CR, the APOE genotype, and the hippocampal volume could serve as predictors of the potential benefit of CT in the experimental group. We hypothesized that a higher CR, not having the APOE ε4 allele, and a larger hippocampal volume would predict better CT outcomes.
Participants and Methods: The participants of this study, 226 senior citizens without dementia, were randomized into parallel experimental (115) and control (111) groups. They were assessed using a neuropsychological protocol: 7 Minutes (7M) Test, Wechsler Memory Scale Logical Memory (WMS LM), Trail Making Test (TMT) forms A and B, and Verbal Fluency Phonological and Semantic Test; while also obtaining additional data: total intracranial, gray matter, left and right hippocampus volumes; APOE; and CR. The CT intervention involved multifactorial training using UMAM Method (30 sessions, 90 minutes each), and evaluation pre-and post-training (at six months). The control group followed the center's standard activities. The main outcome measures were the change in cognitive performance and the predictors of change.
Results: The variables that differed significantly between pre- and post-training ("change") were: 7M Test total score, 7M Clock Drawing Test, WMS LM Immediate Units, WMS LM Delayed Units, Phonological verbal fluency-FAS, Semantic verbal fluency, TMT A Time, TMT B Time.
APOE e4 non-carriers (79.1%) and people with a larger left hippocampal volume achieved more gains in semantic verbal fluency (R2=.19). Subjects with more CR and greater gray matter volume better improved their processing speed (R2=.18); age was a predictor of processing speed such that higher age predicts less improvement (R2=.07). The subjects with a larger left hippocampal volume achieved greater improvement in general cognitive performance (R2=.087).
Conclusion: Four factors conditioned the improvement produced by our CT: age; APOE genotype; the CR; and brain volumes, namely total gray matter volume and left hippocampal volume. These predictors are specific to the cognitive functions: specific predictors and specific areas, although, in addition to the main effect of the CT itself, other predictors were not studied here. Thus, to achieve better results by CT, it is important to consider different characteristics of the participants, including genetic factors.
Trial registration: Trial retrospectively registered on January 29th, 2020 - NCT04245579

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23 Cross-Cultural Variables and Computerization on Neuropsychological Test Performance among Young-old Adults

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Objective: Aging and minority status are substantial risk factors for cognitive decline and dementia. These risk factors are of significant public health concern considering the population aging phenomenon and the population worldwide becoming more ethnically, culturally, and linguistically diverse. Specifically, the Latino population in the U.S. is projected to have the highest increase in prevalence of Alzheimer's disease (AD) and other dementias in the next four decades, as compared to other ethnic groups. Additionally, we now know that cognitive decline starts years before a dementia diagnosis can be made in the young-old adult years, but limited research explores this early cognitive decline and even less in culturally diverse populations. In fact, Hispanic or Latino populations are underrepresented in neuropsychological research in general, so information about normal cognitive aging, dementia, diagnosis, and interventions is insufficient. Current recommendations indicate that tests must be tailored to the population they are meant to serve. In this line, EMBRACED is the first neuropsychological battery that is domain-specific, cross-cultural, computerized, and available for free to mitigate this gap within the neuropsychology specialty. The present study investigates the usefulness and validity of EMBRACED in young-old adults from different cultural backgrounds, Hispanic and non-Hispanic.

Participants and Methods: The sample includes a total of 128 healthy community-dwelling adults aged 55-75yo. All participants will complete the EMBRACED battery. Of them, 64 will complete a computerized (iPad) version, and 64 participants will complete a parallel paper-and-pencil version based on the EMBRACED battery. Half of the participants are Hispanic, and the other half non-Hispanic (n=32 x 4 cells). Two-way between groups analysis of variance (ANOVA) will be used to analyze the main effects of each independent variable (culture and battery format) and the interaction effect between the two. Pearson's correlation coefficients will be used to explore the psychometric equivalency between the paper-and-pencil and the computerized version.
Results: Based on previous studies by our group in younger populations we expect to find no significant differences in scores between the computerized and the paper-and-pencil versions of the EMBRACED battery. Likewise, differences between the cultural groups are expected, with non-Hispanics scoring higher than the Hispanic group in most of the tasks. Significant interaction effects between computerization and cultural group are also expected. We also expect to find high and significant correlations between the computerized and the paper-and-pencil versions of the EMBRACED battery, regardless of the cultural group.
Conclusions: Our results will demonstrate that the computerization of the tasks did not affect the validity of the measures. Also, the cross-cultural sensitivity of the instrument will be demonstrated by the differences found between the cultural groups regardless of the mode of delivery. This study will provide useful information about healthy patters of aging in both Hispanics and non-Hispanics, which is currently a gap in the existing knowledge. This will improve the services provided to Hispanic minorities in the U.S.

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24 "I'm not wearing that!" Avoiding Stigma While Sustaining Safe Community Independence.

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Objective: Falls are the leading cause of injury-related death and disability amongst adults aged 65 and older. Most fall-related hospitalizations are due to hip fractures and head injuries,[1] falls being the most common cause of TBIs.[2] Further, fear of falling leads to a reduction of daily activities that makes a person more likely to fall again.[3] Aware of these issues, caregivers seeking to promote independent living and quality of life can overlook simple considerations, including compliance issues. This case study demonstrates the importance of participant "buy-in," and presents pros and cons of technological aids to assist seniors aging in place.
Participants and Methods: ML is a 94-year-old White widow with 16 years of education. Medical conditions include hypertension, scoliosis, and poor balance, necessitating a single-point cane. Cognition is good (MoCA = 29). Active in her community, and independent in all extended ADLs, including driving, ML strives to age in place, but fears falling. With her distant family's encouragement, ML obtained a pendant-style fall detection device and monitoring system (a "personal emergency response system" or PERS device). However, concerned that the pendant stigmatized her as "frail," she declined to wear it, a fact she did not disclose for 3 years. At her family's suggestion, she acquired an Apple Watch (SE; GPS + Cellular). Configured to resemble a very simple

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watch, it detects hard falls, and, unless dismissed ("I'm OK"), uses its own cellular plan to call emergency services and emergency contacts, and provide her location. She can also invoke these services through a button press ("Emergency SOS"). The watch also gives first responders access to her medical information, including emergency contacts, medical conditions, and medications.
Results: Challenges to setup and use included cellular service providers' unfamiliarity with setting up the watch as a stand-alone cellular device; ML's adapting to a new technology (touch-sensitive surfaces); and providing training over Zoom. Positive outcomes include ML's mastery of basic watch functions (checking battery levels, charging). Compliance (watch wearing) has been excellent, including during bathing. Though she has not experienced any falls, her confidence in moving about her home and community has reportedly increased. Moreover, the cost of the watch and cellular service are much less than those of pendant-based services, and ML views the watch as fashionable, rather than stigmatizing.
Conclusions: This project demonstrates that new wearable technology has a role to play in sustaining safe community independence, at least amongst cognitively intact seniors.
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25 Should function in daily life activities be included as an early predictor of Alzheimer's disease?

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Objective: Mild symptoms of cognitive impairment may interfere with activities of daily living (ADL), such as managing finances and medication, running errands, preparing meals, and maintaining interests and abilities to take part in already established hobbies, but the diagnostic criteria for a dementia syndrome are not met until a patient shows a major functional disability in these ADL activities. In the present study, we ask if even subtle changes should be given weight as an early predictor of AD.
Participants and Methods: Longitudinal data from the Alzheimer's Disease Neuroimaging Initiative (ADNI) were used to define two groups: a group of adults with a mild cognitive impairment (MCI) diagnosis remaining stable across several visits, sMCI (n=360; 55-91 years at baseline); and a group of adults who over time converted from having an MCI to an AD diagnosis, cAD (n=320; 55-88 years at baseline). Eleven clinical relevant neurocognitive features were used as input in a Random Forest (RF) binary classifier (sMCI vs. cAD). The trained model was tested on an unseen holdout part of the dataset. Three different permutation-driven importance estimates and a comprehensive post-hoc machine learning exploration was applied to build trust and confidence in the model.
Results: The pooled results consistently showed that measures of daily life functioning, verbal memory function and a volume measure of hippocampus were important predictors of conversion from MCI to AD. Results from the RF classification model showed a prediction accuracy around 70%. Most importantly the post-hoc analyses showed that even subtle changes in everyday functioning noticed by a close informant put MCI patients at increased risk for an AD diagnosis later in life.
Conclusion: Our results should inspire further longitudinal high dimensional studies of meaningful subgroups of MCI subjects at an asymptomatic stage. Our results strongly support an important role of early, subtle, observed functional changes in daily life situations, and that measures of these changes should be included as part of a neuropsychological assessment in an early stage of AD.

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26 Effects of the consumption of anthocyanins and flavanols in adults, POLYAGE Study.

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Objective: The objective was to determine the effect of the consumption of anthocyanins and flavanols on the cognitive functions in 3 groups with different dietary intake.
Participants and Methods: The present study was designed to assess possible benefits of an increased dietary polyphenols intake in adults, women and men, aged between 50 and 75 years. The project hypothesis was that the combined intake of anthocyanins and flavanols might improve cognitive function in adults.
The 60 volunteers were divided into three groups (20 each) according to the type of product consumed: group 1 consumed a mixture of red berries; group 2 consumed a cocoa powder rich in polyphenols and group 3 consumed a mixture of cocoa and red berries. The groups were balanced by sex, average flow mediated dilation (FMD) and smoking status. Volunteers visited ICTAN's Nutrition Unit (Madrid, Spain) at 3 occasions: visit 0, for inclusion, visit 1 at the beginning, and the last one after 10 weeks. Volunteers were recruited through posters and oral communications in the Madrid area, as well as online and via dissemination through CSIC channels and social networks.
The selected patients were healthy. They met the following requirements: A minimum MMSE score of 28; 0 or less on the Functional Activities Questionnaire and less of ten on the Beck depression scale.
The following neurocognitive tests were performed: Verbal Learning Test Spain-Complutense, Spatial Recall Test 10/36, Letters and Numbers, Digits, Symbol Digit Search (Wechsler Adult Intelligence Scale IV), Stroop Task, Tower of London, Number Key (WAIS-III), Number cancellation (ADAS-COG). Depression and anxiety were also evaluated. Finally, data collected was analysed for statistical significance.
Results: The patients had an average of 57.98 (s.d. 6.90) years old, and 13.57 (s.d. 4.32) average of years of study. The three groups had a similar age and cultural level.
Statistical significant differences were found between groups in the recognition of word list and in the Tower of London. The group did not differ in anxiety or depression.
Conclusions: The Intake of polyphenols is associated with beneficial health effects. Flavanols are widely distributed in fruits, cereals and vegetables, being fruits and cocoa the major source of them. They have shown a positive effects in memory and executive functions.

27 Associations Between the Oxford Digital Multiple Errands Test and Broad Functional Outcomes in Subacute Stroke

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Objective: The Oxford Digital Multiple Errands Test (OxMET) is a brief cognitive screen, intended as an ecologically valid approach to assessing complex executive function, in contrast to traditional abstract neuropsychological assessments with high language demands. Psychometric validation of the OxMET, was found high internal reliability and test-retest reliability, as well as good convergent and divergent validity. Here we assess aspects of predictive and ecological validity of the OxMET measures in relation to commonly used clinical function scales in a subacute stroke sample.
Participants and Methods: Participants within 6 weeks of confirmed stroke were recruited from a UK English-speaking specialist stroke rehabilitation in-patient setting between November 2020 and March 2022. Each completed the OxMET with a researcher, whilst clinical outcome measures were collected from medical notes: Barthel Index and stroke the specific "Therapy Outcome Measure" scale.
Results: Participants (n=98) were on average 24 days post stroke (*SD*=17), had a mean age of 74 (*SD* =12.9) and mean NIH Stroke Severity of 8.3 (*SD*= 5.3). We found a significant but small relationship between the OxMET accuracy and both Barthel Index (r=.24) and TOMS summed total score (r=.21) but did not find a relationship with more specialist OxMET measures such as error types.
Conclusions: The OxMET, an executive function assessment screen, was found to weakly relate to specialist stroke rehabilitation relevant measures of functionality. We note that

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the measures in TOMs and Barthel are limited in sensitivity and have a strong physical focus. The primary purpose of OxMET regards screening for executive function, which may relate more to complex instrumental activities of daily life and participation. Further research into predictive validity on more complex activities of daily life, once discharged home is ongoing.

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28 Validation of the Oxford Cognitive Screen-Plus in UK-based English-speaking Subacute and Chronic Stroke

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Objective: Stroke survivors are routinely screened for cognitive impairment with screening tools which often fail to detect subtle impairments. The Oxford Cognitive Screen – Plus (OCS-Plus) is a brief computer tablet-based screening tool designed to detect more subtle impairments. We aimed to examine its psychometric properties in two stroke cohorts (subacute = <3 months post-stroke and chronic = 6 months post-stroke).
Participants and Methods: 328 stroke survivors (162 subacute, 166 chronic, average age 72 (SD=13), education 12 (SD=3), sex 42% female presenting, ~60% ischaemic stroke) from two in-patient stroke units in the UK were recruited between May 2016 and March 2022, and a subset was followed up at 6-months post-stroke. All participants completed the OCS and OCS-Plus. A subset additionally completed the Montreal Cognitive Assessment (MoCA), and further format- and construct-matched neuropsychological tests. Due to the tablet-based format, OCS-Plus provides standardised assessment for non-specialist administration and automatic real time impairment classification against a matched normative set.
Results: Incidence of cognitive impairment was higher in subacute stroke survivors compared to chronic stroke survivors, with the highest rates of impairment found for visuospatial and executive subtests. We provide sensitivity and specificity for each of the subtests in the OCS-Plus screen compared to neuropsychological test performance. Notably, many of those who were unimpaired on the MoCA and Oxford Cognitive Screen, demonstrated impairment on neuropsychological testing and OCS-Plus screening. Construct validity criteria were met and exceeded the psychometric findings in healthy control data.
Conclusions: The OCS-Plus is a valid cognitive screening tool for use in stroke. OCS-Plus is able to detect subtle cognitive impairment at a similar level to neuropsychological assessment and exceeds detection of impairment compared to the OCS and MoCA.

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29 Cognitive Tests For Older Adults with low Literacy Levels: in Search of the Ideal Cognitive Screening Protocol

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Objective: An adequate determination of educational level and validation of instruments in populations with heterogeneous levels of literacy requires further research. We aimed to test a cognitive screening protocol that tries to capture cognitive performance in widely used cognitive screening tasks as well as a set of tasks that are expected to be unbiased for literacy levels (Pellicer-Espinosa & Diaz-Orueta, 2021). It is hypothesized that individuals with low literacy levels will show a differential, significantly better performance in those complementary tasks versus widely used cognitive tasks.
Participants and Methods: Participants were 100 older adults (50% female) from the community attending specialized care facilities in a hospital setting in southern Spain. The protocol comprised a brief set of questions to gather information about the education level (years of formal education, Spanish version of the Word Accentuation Test, saying the alphabet, counting from 1 to 20 forwards and backwards, and the Mental Alternation Test). As a routine part of the screening, the DSM-V neurocognitive disorders criteria, the Global Deterioration Scale and the MMSE were administered. For the set of cognitive tasks, both phonetic (letter P) and semantic fluency (animals), the BNT-15, calculus (subtractions of 7), clock-drawing test (command, copy and trace versions), and Digits Forward and Backwards were administered. Additionally, drawings from the ACE-III (infinite loop and cube), Fototest and Verbal Fluency for names (opposite and same gender) were administered as low literacy appropriate tasks. Clock Reading

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Test will be used as a contrast to evaluate performance in the clock drawing test.
Results: Verbatim responses to all tasks were registered or recorded with participants' permission. For visuoconstructional drawing tasks, performance was video recorded, and sequence of completion were analysed from a process-based approach perspective. Performance was analysed in relation to participants' age, gender and educational level (both self-reported and registered at the beginning of the screening session). Differential performance between traditional tasks and literacy-appropriate tasks was further examined.
Conclusions: The traditionally used cognitive screening protocols need to be flexible in terms of tasks included in order to properly identify more accurately whether cognitive performance reflects actual cognitive status or problems that individuals with low literacy show when faced with cognitive tasks that are highly demanding for their literacy levels. This will reduce the rate of false positives for MCI and dementia in cognitive screening settings.

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30 Does Phonemic Fluency rely Primarily on a Switching Strategy and Semantic Fluency on a Clustering Strategy?

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Background: The verbal fluency (VT) task assesses phonemic and semantic fluency. Phonemic fluency is often considered to rely on a "switching" cognitive strategy and semantic fluency on a "clustering" cognitive strategy.
Objective: To examine whether phonemic fluency relies exclusively on a "switching" strategy and semantic fluency on a "clustering" strategy, a quantitative (total number of correct words) and a qualitative scoring method (i.e., clustering and switching) were applied to determine the main cognitive strategies underlying individual performance longitudinally in a sample of healthy, older adults.
Participants and Methods: Twenty-seven highly educated (mean education =17.15 yrs, SD=3.21) healthy older adults (mean age=76.84, SD=4.53), were administered the VF, along with other neuropsychological tests once a year for six consecutive years.
Results: Medium to high correlations were found between phonemic fluency and the number of switches (mean r=0.72, p=0.00) as well as between the number of clusters (mean r=0.73, p=0.00) for all six years. Medium to high correlations were also found between semantic fluency and the number of switches (mean r=0.57, p=0.000) and the number of clusters (mean r=0.70, p=0.000).
Conclusions: Neither phonemic nor semantic fluency appeared to rely on one main strategy. Phonemic fluency did not rely exclusively on a switching strategy and semantic fluency did not rely exclusively on a clustering strategy, contrary to previous reports. Rather, these findings suggest that both strategies are involved to a comparable extent in phonemic as well as semantic fluency.

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31 The Methodology of Cross-Cultural Evaluations for Social Cognition: A Systematic Review

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Objectives: This study aimed to systematically review literature on cross-cultural, culturally adapted and/or translated neuropsychological assessments for social cognition and outline their methodological approaches. Neuropsychological evaluations are normed on western populations resulting in test misinterpretation in culturally diverse individuals. This issue is particularly pertinent in the evaluation of social cognition due to; a) the bilateral relationship between culture and social cognition; b) the implications of social cognition in neuropsychological diagnoses; and c) the limited number of currently available tools to assess social cognition. The objective of this study was to outline what has been created and their methodological approaches to identify opportunities for future research and provide methodological recommendations.
Participants and Methods: A systematic review following PRISMA guidelines was performed in three databases without restrictions regarding language or year of publication. The search produced 7,349 articles which were then screened by a single reviewer based on title and abstract inclusion criteria; a) the article was a study (i.e., conference notes and letters to the editor were excluded); and b)

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the study included an assessment of social cognition or a component of social cognition (i.e., self-report measures were excluded). The full-text of the resulting 236 articles were then screened by two reviewers with an additional inclusion criterion; c) the social cognition measure was cross-cultural, culturally adapted and/or translated. Articles were then classified under the social cognitive component it measured (e.g., theory of mind vs. moral reasoning). The methodological quality of the cross-cultural or culturally adapted/translated assessments were evaluated using the International Test Commission (ITC) Guidelines for Translating and Adapting Tests and the ITC Guidelines for the Large-Scale Assessment of Linguistically and Culturally Diverse Populations.
Results: Fifty-seven articles were included in this study: 17 for emotion recognition, 26 for theory of mind, nine for moral reasoning, and five for the overall evaluation of social cognition. Overall, eight assessments were cross-cultural and 49 were adapted/translated. None of the studies met all the quality requirements of the ITC Guidelines
Conclusions: Despite the importance of having cross-cultural or culturally adapted/translated evaluations for social cognition, there remains a considerable lack of tools available. Although there have been some efforts in addressing this gap, researchers tend to adapt tests for a specific cultural population which remains limited in addressing the full scope of cultural diversity in social cognition. In addition, researchers utilized limited methodological procedure to assure validity of the cross-cultural or adapted/translated tests. This study therefore outlines the need for cross-cultural and methodological rigorous evaluations for social cognition.

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32 Long-term recognition-memory as a progression predictor from mild cognitive impairment to dementia.

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Introduction: In the last few years there's been an increasing interest in the study of cognitive markers that contribute to the diagnosis of the Mild Cognitive Impairment (MCI), due to the fact that in some cases there can be a prodromal symptom of dementia. Neuropsychological assessment is essential to detect cognitive impairment.
Objective: To study the sensitivity of episodic memory tests to detect which patients with MCI could progress to dementia (after a longitudinal follow-up).
Participants and Methods: Prospective observational longitudinal study. Spanish sample diagnosed with MCI from a dementia outpatients' clinic were consecutively included. Exclusion criteria were that the subjects who in the basal assessment presented other significant neurological diseases, psycothic symptoms, substance abuse, severe sensory impairment or dementia according to DSM-5 criteria. We also excluded patients who showed cognitive and functional improvement at the second assessment (they didn't meet the MCI criteria at follow-up). Data from comprehensive basal neuropsychological assessment (orientation, memory, language, praxis, gnosis, executive functions) was compared to the 12-24 months follow-up evaluation. Two groups were established according to the stability or decrease of the marks obtained in both assessments. Statistical analyses were performed to study if there were significant differences in selected assessments between both groups (Stable MCI and Unstable MCI), the predictive capacity of language and memory tests was also analysed.
Results: $N = 37$ participants were included, 27 women (45.95%). No significant differences were found between men and women in age range 58-91 y.o. (M = 75.14; DT = 8.17) and education (rank 0-14 years scholarship). Stable MCI ($n = 18$) and Unstable MCI ($n = 19$) did not differ neither in years of education nor in cognitive mental state (assessed by Mini Mental Examination Cognitive scale). They differed in age, which was lower in Stable MCI group ($F_{(4.480)} = 2.572$; $p = .015$). The analysis performed demonstrated that the total long-term recognition in memory test was the most sensitive to predict the evolution from MCI to Dementia ($x^2 = 5.120$; gl = 1; $p = .024$). Patients with MCI at the basal assessment who progressed to dementia at the follow-up, already have shown altered performance in long-term recognition at the basal assessment. We didn't find significant differences between performance (altered or normal) at the basal

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evaluation for participants who maintained stability versus dementia at follow-up, for the rest of the administered tests.
Conclusions: Assessments evaluating episodic memory, especially long-term recognition, seem to be fundamental to detect MCI and its possible evolution to dementia. Therefore, it may help make early interventions to prevent in time the progression of cognitive impairment.

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33 Reliability and Validity of the Virtual Meeting Task

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Objective: Many individuals with acquired brain injury (ABI) experience slowness in information processing speed (IPS). Compensatory strategy learning has been proven to support people with ABI in the execution of everyday activities, such as participating in a group conversation. However, there are few instruments to objectively measure compensatory strategy-use related to slowed IPS. Inspired by the recent trend to work from home, we developed an innovative experimental task, the Virtual Meeting Task (VMT), which examines strategy planning, strategy execution and task execution in a pre-recorded digital setting. This study investigates the reliability and validity of the VMT as an objective assessment of compensatory strategy-use related to slowed information processing speed (IPS) in a healthy population.
Participants and Methods: The study population consisted of 53 healthy adults (Group 1: older adults, N=29, age 65-80; Group 2: younger adults, N=24, age 18-30). The participants performed parallel, randomised versions of the VMT at baseline level (T0) and at an eight-week follow-up (T1). In the VMT, the participants were instructed to partake in a pre-recorded virtual meeting and answer questions on the content of the conversation. Participants could use strategies to prevent time pressure (e.g., note-taking) and to manage induced time pressure by selecting strategy buttons that elicited a response (e.g. asking for repetition). After each scene, the participant answered questions on the content of the conversation. Test-retest and parallel-form reliability of the VMT were examined using intraclass correlation coefficients (ICC). Construct validity was assessed using the Mental Slowness Observation Test (MSOT), an instrument measuring strategy-use and performance on untrained tasks. Ecological validity of the task was evaluated using a self-rated questionnaire on compensatory strategy-use in everyday life (Time-Pressure Questionnaire) and a self-rated questionnaire evaluating perceived consequences of slowed IPS (Mental Slowness Questionnaire; MSQ).
Results: A compound score was calculated that included three variables: task execution (number of correct reproductions of information points), strategy planning (number of implemented strategies prior to the task), strategy execution (number of implemented strategies during the task). The ICC2,1 between Version 1 and Version 2 was 0.81 (IC 95%: 0.649 – 0.891), which indicates a good test-retest validity. The ICC2,1 between Timepoint 1 and Timepoint 2 was 0.80 (IC 95%: 0.660–0.886) and indicated good parallel-form reliability. A significant moderate correlation of 0.44 ($p<0.001$) was found between the baseline measure of the VMT (compound score) and the number of elements correctly achieved on the MSOT (Elements score). The variability between the test scores was high ($t(52)=2.723$, $p=0.009$). The correlations between the Time-Pressure Questionnaire ($r=-0.79$, $p=-0.57$) and the MSQ ($r=-0.19$, $p=0.18$) were small and not statistically significant.
Conclusions: This study shows that the VMT is a reliable and valid instrument to objectively measure compensatory strategy-use related to slowed IPS, and has moderate construct validity, good test-retest reliability and good parallel form reliability. With respect to the ecological validity, we did not find significant correlations between the VMT and self-rated everyday use of compensatory strategies

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34 A results comparison between a new nonverbal screening test for cognitive impairment and dementia (TUGA)

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Objective: In a longitudinal study that lasted 2 years, we assessed 150 subjects (91 control group / 59 dementia group) and compared their results in an experimental nonverbal test (TUGA), for cognitive impairment and dementia, with the results obtained by the same groups in two major screening tests, the Montreal Cognitive Assessment (MOCA) and the Addenbrooke Cognitive Examination Revised (AC-ER).

Participants and Methods: To validate our test and to confirm the frontal assessment characteristics and the non-verbal abstract reasoning nature of TUGA, we also correlated the scores obtained, with the results in two other tests, the Frontal Assessment Battery (FAB) and the Raven Progressive Matrices Standard (RPM- std). Finally, to have a characterization of the level of autonomy of our dementia group and follow any changes on this dimension throughout the study, we have also applied the Barthel Activities of Daily Living Index (BI).

Results: The result showed that, (1) TUGA total scores have a strong correlation with MOCA (r=,796, p ? ,001) and ACE -R (r=, 761, p ? ,001) total scores and moderate correlation with FAB(r=,551, p? ,001). (2) For an optimal cutoff score of 7,5 TUGA had a specificity of 80% and a sensitivity of 78%, with statistically significant differences with MOCA and ACE-R. (3) The evidences show that in both moments of evaluation, TUGA (78,0% - 96,6%), is not only more sensitive detecting cognitive impairment related dementia, butdetectsitearlierthanACE-R(6,8%-66,1%)andMOCA(3,4%-22,4%). (4)TUGAisas sensitive to dementia paitents with frontal lobe deficits and/or with psychomotor slowing.(5) The individual Deck observation of TUGA results, gives useful qualitative and quantitative information about the possible etiology of the scores(.6) TUGA total scores have a moderate correlation with RPM-std (r=,526, p ? ,001) and as expected, a very strong correlation with TUGA Deck D RPM-std (r=,914, p ? ,001), opening the wide range of clinical possibilities and application areas. These results become even more relevant if we consider the simplicity of TUGA tasks.

35 Test Barcelona Workstation

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Objective: The Barcelona Test is a tool of basic and general neuropsychological assessment published in 1990, which has continuously been adapted to the needs of the neuropsychologist. Thanks to new technologies is now possible to optimize the initial objective of the project: an integrated neuropsychological assessment. This paper describes the development, structure, contents and functionalities of an online version of the project, the Barcelona Test Workstation (BTW). The workstation is based on normative data and generates reports and databases automatically.
Participants and Methods: A team of clinicians and computer scientist was created. The Workstation was organized in a three-fold structure of Internet pages: (1) *Patients* [management area], which includes patient registration, management and control functionalities, (2) *Visits* [Clinical history and medical tests area], which presents the specific subfields of a medical visit, especially neurological, and (3) *Profiles* [assessment area], which includes all areas of neuropsychological assessment. The latter was organized in sections that include: (A) The Dem-Detect battery, for cognitive deterioration screening. (B) Barcelona-Test (six modules: Language-attention-orientation; Reading and writing; Motor-praxis; Perception-gnosis; Memory; Abstraction-execution). (C) Barcelona-Test ID, for cases of intellectual disability. (D) The Neuronorma Battery, with the most complex and psychometric tests (TMT, SMDT, JLO, Token Test, FCSRT, ROCF, Verbal fluencies, Stroop, TOL). (E) Neuropsychiatric instruments. (F) The daily life scales and its severity. Finally, the functionality of writing the clinical report is also included in this area. All possible calculations were automated. To automate the conversion from raw scores to standardized scores, a database was generated and coded according to the basic parameters of the neuropsychological assessment: sex, age and

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education.
Web development: PHP programming and MySQL, with the content management system (CMS) Joomla! were chosen. As a browser Mozilla Firefox was chosen. A specific server was established for the project. The system is currently being developed in Catalan, Spanish, English, and Portuguese
Results: The workstation incorporates all components of a comprehensive neuropsychological assessment. All the areas and functionalities of the system are presented. Illustrative clinical cases are also presented, including automatic reports (single and comparative). The generation of databases is shown.
Conclusions: The BTW represents the technological achievement of the initial objective of creating a global program of neuropsychological assessment and management. The workstation is a breakthrough and becomes a fundamental tool for neuropsychological work. Finally, it should be noted that the workstation constitutes an open system constantly upgradeable in contents and functionalities. On this basis, our future developments are heading toward the forensic neuropsychology and rehabilitation fields.

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36 Extended Spanish and Catalan Normative data of the Memory Binding Test in 2741 Volunteers from the ALFA Study

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Objectives: The Memory Binding Test (MBT) is a challenging verbal episodic memory test that was developed to overcome the limitations of the Free and Cued Selective Reminding Test for detecting early memory impairments. The MBT consists of two coordinated lists of 16 words that share the same semantic categories in pairs, favoring a binding procedure, and assesses learning and delayed retention by testing cued, paired, and free recall. Mounting evidence showed that MBT performance is related to early pathophysiological Alzheimer's disease (AD) changes, it is useful for detecting mild cognitive impairment and possesses predictive validity of incident dementia. However, the availability of normative data for this test is yet very scarce. We have previously developed the Spanish and Catalan adaptations, and two parallel versions of the MBT, studied its psychometric properties, and published preliminary reference data for the Spanish version A in 472 volunteers aged between 45 and 65 years old. The present study aims to offer extended reference norms for the Spanish and Catalan versions of the MBT in a bigger sample and a wider age range (from 45 to 74 years).
Participants and Methods: We analyzed data from 2741 cognitively healthy volunteers enrolled in the ALFA study. Participants were excluded if they presented cognitive impairment or any medical, neurological or major psychiatric condition that could interfere with cognition (see doi: 10.1016/j.trci.2016.02.003). MBT immediate and delayed, free and cued recall scores, as well as number of pairs recalled and indexes of interference and retention, were studied. Spanish MBT version A was administered to 639(23.3%) individuals, Spanish version B to 388(14.2%), Catalan version A to 848(30.9%), and Catalan version B to 866 (31.6%). Since we have previously demonstrated the equivalence between versions using a thorough methodology, we developed the current reference data pooling the whole dataset. We constructed a set of multiple regression models (one for each MBT variable), with the cognitive score as dependent variable and age-centered, education (with 4 category levels [elementary=0, secondary=1, graduate=2, postgraduate=3]), and sex (male=0; female=1) as predictors. A backward stepwise method was used, with a criterion of $p < 0.1$ for the beta coefficient to maintain a predictor in the model. We created formulas to calculate the z-scores associated with a given score using the constants and the coefficients obtained to predict scores, and dividing the difference between the actual and the predicted score by the standard deviation of the unstandardized residuals of the regression model.
Results: We found that age, education level and sex were significant predictors in all the main MBT variables (except in the retention indexes).

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Age and education exerted higher impact (standardized beta around 0.2) than sex (standardized beta around 0.1) in the scores. Formulas to calculate adjusted z-scores were created.
Conclusions: The present study provides reference norms obtained from a large sample for the Spanish and Catalan versions of the MBT. Such norms may help in the detection of subtle memory impairments that may be undetected by less challenging tests.

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37 Development of Normative Data Based on a Qualitative Measure of Educational Level for the MUNS Scale

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Objective: The Multicultural Neuropsychological Scale (MUNS) is a short scale devised with multi-cultural stimuli. Reading Fluency (RF) has emerged as a proxy for quality of education, therefore, RF was measured to determine participants' educational level. The aim of this study was to develop regression-based Argentinian norms for the MUNS, analyzing the effect of age, sex and education. RF was used to measure educational level instead of years of schooling.
Participants and Methods: One hundred and eighty-four healthy Argentinian participants were included in the sample. The age range was 15–80 years old. The RF was developed by considering the number of words read correctly per minute. The RF ranged from 101 to 205. Sixty-six percent of the sample were female. For the normative data analysis, the regression-based method was followed. In order to normalize the score distribution, raw scores were transformed to scaled scores (mean = 10, SD = 3) based on the cumulative frequency of the normative sample. Next, using the scaled scores as the dependent variable and age, RF, and sex as predictive variables, a multiple regression analysis was performed.
Results: Two predictors had a significant influence on the MUNS scaled score, namely, age and RF. Results showed a direct relationship between RF and MUNS scaled score, and an inverse relationship between age and MUNS scaled score. The adjusted R^2 explained 20% of the variance in the dependent variable. In accordance with these results, the following prediction equation was formulated: Predicted Scaled Score = Constant + b_1 * age + b_2 * reading fluency. Sex was excluded from the equation since it did not contribute significantly to the prediction of the dependent variable.

Conclusions: As expected, normative data were influenced by age and RF. The data reported here allows for the assessment of participants with a wide range of age and educational levels. The norms developed in this study will allow clinicians to assess the performance of Argentinian participants by calculating their demographically adjusted z-score.
The inclusion of a qualitative measure of educational level in a normative study is rather innovative. RF demonstrated to be an appropiate predictor of the performance on the MUNS.

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38 Development of Normative Data Based on a Quantitative Measure of Educational Level for the MUNS Scale

Alberto Luis Fernandez[1,2] , Gabriel Jáuregui Arriondo[1] , Maximiliano Folmer[3] , Marcelo Vaiman[1,2] , Gazul Rotela Leite[1] , Julieta Castro Brunello[1,2]

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Objective: Normative data for the Multicultural Neuropsychological Scale (MUNS) were developed using reading fluency as a proxy for educational level. However, the are some situations in which the testee cannot read (alexia, illiteracy, dyslexia, or sight difficulties). Therefore, the aim of this study was to develop regression-based Argentinian norms for the MUNS analyzing the effect of age, sex, and education. The educational level of the testee was based on the number of years of schooling completed.
Participants and Methods: one hundred and eighty-four healthy Argentinian participants were included in the sample. The age range was 15–80 years old. The years of schooling ranged from 4 to 20 years. Sixty-six percent of the sample were female. For the normative data analysis, the regression-based method was followed. The multiple linear regression model's statistical assumptions were met. In order to normalize the score distribution, raw scores were transformed to scaled scores (mean = 10, SD = 3) based on the cumulative frequency of the normative sample. Next, using the scaled scores as the dependent variable and

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age, years of schooling, and sex as predictive variables, a multiple regression analysis was performed.
Results: The number of years of schooling and age had a significant influence on the MUNS total scaled score. In this case, results showed a direct relationship between numbers of years of schooling and MUNS total scaled score, and an inverse relationship between age and MUNS scaled score. The adjusted R^2 explained 27% of the variance in the dependent variable. In accordance with these results, the following prediction equation was formulated: Predicted Scaled Score = Constant + b_1 * age + b_2 * number of years of schooling . Sex did not contribute significantly to the prediction of the dependent variable.
Conclusions: As expected, normative data were influenced by age and the number of years of schooling. The data reported here allows for the assessment of participants with a wide range of ages and educational levels.
The norms developed in this study will allow clinicians to assess the performance of participants who cannot read by using the number of years of schooling to estimate their educational level.

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39 Reliability Study of the Abbreviated Version of the Luria's DNB-2 for Spanish Older Adults.

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Objective: To determine the inter-rater and test-retest reliability of the new abbreviated version of the Luria's Diagnostic Neuropsychological Battery (DNB-2) for Spanish older adults.
Participants and Methods: A total of eleven cognitively normal volunteers (over 55 years old) took part in this study. Each participant was assessed using a comprehensive neuropsychological battery, including the Luria DNB-2 and other standardized tests (i.e., Mini-Mental State Exam; Addenbrooke's Cognitive Examination III; Digital Symbol Modalities Test, the Logical Memory (LM) subtest of the Wechsler Memory Scale (WMS-IV) and the Controlled Oral Word Association Test among others). Intraclass correlation coefficients (ICCs) and Pearson's correlation coefficient (*r*) were calculated to examine the inter-rater and test- retest reliability of DNB-2, respectively.
Results: Eleven participants (mean age= 61.36 ± 4.82; 8 females and 3 males) were assessed at baseline and at one month later (mean follow-up =1.12 ±0.19 months). All of them had completed the secondary school and education (in years) was 17.45 ± 4.89. The correlation value for the test-retest reliability was strong (r = .943, IC 95%, .773 to .984, p <.001) and the inter-rater reliability total score was excellent (ICC=.926, IC 95%, .751 to .980, p <.001).
Conclusions: This study suggests that Luria DNB-2 is a reliable instrument to assess the cognitive function in Spanish adults over 55 years old.

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40 Factor structure of the CNS VS cognitive test battery in healthy controls and primary brain tumor patients

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Objective: Computerized neuropsychological test batteries such as Central Nervous System Vital Signs (CNS VS) are popular instruments for measuring cognitive functioning, especially in research in the clinical setting. The core tests in the CNS VS battery results in 25 different variables that are not always practical for research and clinical use. CNS VS provides ten different domain scores to overcome this problem. These domain scores, however, are not evidence-based and contain multi-collinearities, complicating statistical analysis and interpretation. Previous work describing the factor structure of CNS VS did not provide consistent results.
Participants and Methods: We performed an exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on a large set consisting of data from 158 healthy Dutch individuals, and data from primary brain tumor patients (393 meningioma, 104 low-grade glioma, and 250 high-grade glioma). We compared the factor structures found for the three patient groups and healthy controls. We further compared the factor scores resulting from a CFA describing all groups and we predicted the group from the factor scores. Additionally, we predicted factor scores from sociodemographic and clinical predictors of cognitive functioning for brain tumor patients to validate the factor scores.
Results: The EFA results showed that CNS VS measures roughly the same constructs for the

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different patient groups while measuring more nuanced constructs in healthy controls. The resulting factor structure of the CFA describing all groups consisted of five factors that we interpreted to represent *speed, memory strategy, memory, inhibition,* and *motor speed.* The factor structure described 44.3% of the variance in the test scores. Factor scores significantly predicted patient group, and scores on each of the factors were predicted by a different set of clinical predictors.
Conclusion: The resulting factors as fitted on patients and healthy participants may be useful for variable reduction in clinical practice, future research, and predictive models, as they were well-interpretable and did not contain multi-collinearities.

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41 Emotion-Action Binding: Emotional Vocal Productions

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Objective: Our brain processes perceptive features and motor actions related to objects in a distributed fashion. This causes a binding problem: how do we dissociate the information pertaining to the different objects we are facing? Hommel (1998) suggested the event file concept: an episodic memory trace linking features and motor responses related to objects. Using adaptations of Hommel's paradigm in previous studies, we observed that emotions expressed by faces and voices could bind with motor actions (here button presses), highlighting the biological relevance of binding automatic reactions to emotional events. So far, no study investigated emotion-action binding using emotional vocal productions instead of button-presses as motor responses.
Participants and Methods: In the present experiment, we asked 32 participants to pronounce pseudowords in an angry or neutral fashion while their productions were recorded with a microphone and an accelerometer located on the neck at the level of the vocal cords. More precisely, participants saw 2 pseudowords (S1 and S2) in succession, each surrounded by chevrons "<>" or "><". They were instructed to pronounce S1 with an angry or neutral prosody either depending on the chevrons or the type of pseudoword displayed. The same task was performed for S2, but the emotional voice was produced depending on the irrelevant feature of S1 (i.e., chevrons if the emotional voice was linked to the type of pseudoword in S1, or vice versa). Our hypothesis was that participants would automatically bind the emotion they produce with the features of the pseudoword in S1 and that this event file would negatively affect the processing of S2 if the elements were partially repeated. This effect is known as "partial repetition cost", and is taken as indication of an event file.
Results: No binding effect was observed with regard to acoustic and accelerometry data. In contrast, participants were significantly faster for a complete repetition or alternation of vocal emotion and pseudoword, or emotion and chevrons, than a partial repetition of these features.
Conclusions: Our findings indicate a partial repetition cost and are therefore compatible with the presence of an event file (binding) of vocal emotion and visual features. Previous studies have shown that the perception of an emotion expressed by a third party or a situation could bind with a motor response. The present data show for the first time that a vocal emotion produced by the observer can trigger an emotion-action integration.

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42 Signal Detection and Decisional Components Influence Electrophysiological Correlates of Recognition Memory

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Objective: Human memory appears to have almost infinite capacity. Recognition memory for the distinction between old and new stimuli is particularly impressive, as it often exceeds 90% accuracy for thousands of items. However, behavioral and electrophysiological studies of recognition memory have essentially been performed using forced-choice tasks. Using two stimuli whereby one is the target prevents the use of signal detection theory (SDT; which distinguishes four answer options: hit, miss, correct rejection, false positive) to analyze performance. Previous studies have suggested two models of recognition memory: a two-factor model, where correct recognition reflects the contribution of familiarity (served by posterior brain regions) and recollection (associated with the frontal cortex), and a one-factor model that remains controversial. Recent EEG studies relied on a specific model to define electrophysiological components and time-windows of interest and did not analyze the data based on signal detection theory. In this study we use a model-free approach to study image recognition with EEG by comparing the electrophysiological signature of all response options based on SDT.
Participants and Methods: Twenty-three participants encoded 360 images of various categories (objects, landscapes, faces, fractals, living things) presented for 750 ms in the first experimental session. The following day they were asked to identify the 360 "old" images intermixed with 360 "new" images in a yes-no recognition paradigm, while a 128-channels EEG was recorded.
Results: Overall, recognition performance was significantly above chance (59.4%). To identify electrodes and time windows of interest, we conducted a waveform non-parametric repeated-measure ANOVA on the type of answer (hit, miss, correct rejection, false positive) across all electrodes and timeframes and individual ERPs. Three regions of interest (ROIs) of several electrodes were identified as predictors of performance: two posterior (left and right) and one medio-central cluster. One time-window (470 to 670ms) returned significant differences. Post-hoc analyses of SDT components revealed an effect of the answer type (i.e., yes *vs*. no answer) on the frontal cluster while SDT components were more differentiated on both posterior clusters. Cluster analysis revealed that hits generated different ERPs than all other conditions, while misses and correct rejections were strongly similar.
Conclusions: Our study suggests that neither the one-factor, nor the two-factor model is sufficient to reflect both memory and decisional processes underlying recognition memory. Electrophysiological traces strongly differ as a function of response type ("yes" vs. "no"), implying that not only familiarity/recollection influence recognition, but also decisional output components. We conclude that recognition memory is not adequately described by previous models and that decisional factors have to be accounted for in further modeling.

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43 Simple Action Planning Paves the Way to Higher-Order Cognition: a Neural Reuse Account of Mental Rotation

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Objective: Functional neuroimaging suggests that the dorsal frontoparietal network (dFPN) – a system of brain regions mainly comprising the posterior parietal and superior frontal cortices – is implicated in various motor and cognitive tasks. However, it is unclear whether the dFPN serves several, computationally independent functions or is the anatomical basis of a common core function that has been reused during evolution to serve newer functions. We hypothesized that the capacity to mentally rotate images partly relies on a phylogenetically older motor process that is rooted within the dFPN. Our hypothesis predicts that neural sources involved in simple action planning may also predict performance in mental rotation.
Participants and Methods: To address this hypothesis, we asked 25 healthy participants to perform a finger tapping task either when the finger was predetermined (externally-triggered) or had to be chosen by the participant (internally-triggered). Multiband fMRI was acquired in a blocked design, and activation patterns were compared across conditions. In a separate session outside the scanner, participants also performed a mental rotation task on pictures of hands or letters.
Results: In the critical comparison (internally-triggered > externally-triggered) fMRI data revealed significant activations in the dFPN and middle occipitotemporal regions. We next extracted from each significant cluster the mean

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and maximum t-values and correlated these with individual reaction times on the mental rotation tasks. Mean and maximum t-values of superior parietal lobule, supramarginal gyrus and ventral premotor cortex of the right hemisphere were positively correlated with the reaction times of the hand mental rotation task. By contrast, no significant correlation was found for the mental rotation of letters.
Conclusions: Our results are compatible with the notions of neural and computational reuse: neural resources and computational processes rooted within parietal and premotor regions of the brain commonly serve simple action planning, but are reused when subjects mentally rotate bodily stimuli even when no overt action is produced.

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44 The Right Cerebral Hemisphere is Dominant for the Updating Component of Working Memory

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Objective: Working memory (WM) is a multi-component cognitive system that allows retaining and manipulating verbal and spatial information over short periods of time (Baddeley, 1992). Neuroimaging evidence suggests that verbal WM is typically associated with left hemisphere function while the processing of visuospatial information more specifically activates the right hemisphere (Smith, Jonides, & Koeppe, 1996; Wager & Smith, 2003). However, this pattern seems to contrast with evidence found in adults after a focal lesion of the left or the right hemisphere. One reason might be the heterogeneity of patient populations and the fact that many studies only assess one component of WM. We here compared the WM performance of focal left (LBD) or right brain damaged (RBD) patients in closely comparable, verbal and spatial WM tasks.
Participants and Methods: We tested 46 RBD and 15 LBD patients within the first three months following focal brain injury, with a verbal and a spatial n-back task. The verbal version comprised a series of five digits presented pseudo-randomly on a computer screen (one number presented at a time). In the low-load WM version (1-back), patients were asked to press a button when the same number was presented twice in succession. In the high-load, executively demanding version (2-back), they had to react if the current digit appeared two steps back. For the spatial modality, patients saw a red square jumping between five blank squares arranged vertically. They either reacted if the red square was shown twice in succession (low-load) or two jumps back (high-load) at the same position. Performance (hits and d') of LBD and RBD patients were compared with a healthy control group.
Results: Overall, LBD patients had a higher hit and d' score than RBD patients. Both groups showed higher hit scores on the low-load compared to the high-load WM and on the verbal compared to the spatial modality. However, both experimental conditions (cognitive load and modality) did not interact across groups, indicating an absence of hemispheric lateralization effects for the mental manipulation of verbal and spatial information.
Conclusions: Our results suggest that patients with damage to the right hemisphere are fare worse on WM tasks (irrespective of modality) than patients with left hemisphere lesions. This finding suggests that the updating component of WM depends primarily on the integrity of the right cerebral hemisphere, irrespective of the precise content that has to be maintained in mind.

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45 Anatomical basis of disorientation after first-ever brain lesion

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Objective: Disorientation in amnesia due to acute organic disease is strongly associated with posterior medial orbitofrontal cortex (OFC) damage or disconnection (1, 2). However, disorientation may also occur as a direct consequence of damage to memory-critical structures, in particular the medial temporal lobe (MTL) (3). In addition it is a hallmark of dementia (4), where it was suggested to result from hypometabolism of parietal and posterior cingulate regions (5, 6). In the present study, we aimed to explore the anatomical basis of disorientation in an unselected sample with a first-ever brain lesion localizable on MRI or CT.
Participants and Methods: Seventy-six patients (age 61.4 ± 12.7 years) hospitalized for

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neurorehabilitation after first-ever circumscribed brain damage were recruited, irrespective of lesion type, etiology or presence of memory impairment. Etiologies encompassed: stroke N=60, traumatic brain injury N=5, tumor resection N=10 and cerebral abscess N=1. Orientation to time, place, situation and person was tested with a 20-items questionnaire of orientation adapted to the hospitalized population. Verbal episodic memory was evaluated with the Rey Auditory Verbal Learning Test. Lesions were manually delineated on the scan (CT or MRI) closest to the testing session. The normalized lesions were analyzed with multivariate lesion-symptom-mapping (LSM) using vector regression-LSM (SVR-LSM) (7, 8) and the orientation score as predicted variable. Lesion volume was regressed out of the data and surviving voxels were identified with a voxel- and cluster correction (N = 10'000 permutations). Eleven patients were excluded because of missing behavioral data or for having no voxels inside the minimum lesion cutoff mask.

Results: Nine patients were disoriented with a score ≤15 on the orientation questionnaire. Twenty-two patients had a significant long-term memory impairment (Z-score < -1.65 delayed recall). The SVR-LSM analyses identified the right OFC and the bilateral head of the caudate nucleus as significant predictors of orientation score.

Conclusions: In an unselected group of patients with first-ever localizable brain lesion, orientation was associated with lesions in the OFC and the caudate nucleus. Similar to previous studies with amnesic patients (1, 2), these results underscore the role of the OFC in maintaining a correct sense of current reality.

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46 Effects of immediate feedback on performance in a task measuring Orbitofrontal Reality Filtering

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Objective: Orbitofrontal reality filtering (ORFi) describes a thought control mechanism which adapts upcoming memories depending on their relation with ongoing reality (1). A failure of this mechanism induces reality confusion, as evident in disorientation and confabulations that patients act upon. The experimental correlate of this failure is an increase of false positive responses in successive runs of a continuous recognition task. The reliability of this task to predict disorientation was shown in population of amnesic and confabulating patients (2, 3), but false positive results have been reported (4, 5). In the present study, we tested an unselected group of brain damaged patients, irrespective of lesion type, aetiology and memory deficit to explore whether the reliability of the task could be increased by providing feedback on every stimulus during task performance.

Participants and Methods: Ninety-six brain lesioned patients (age 60.7 ± 14.1 years) hospitalized for neurorehabiliation were recruited. Aetiologies were as follows: stroke N=64, tumor resection N=10, traumatic brain injury N=9, Wernicke-Korsakoff syndrome N=5, encephalitis N=4, hypoxia N=3, cerebral abscess N=1. Orientation to time, place, situation and person was tested with a 20-items questionnaire of orientation adapted to hospitalized population. Verbal episodic memory was evaluated with the Rey Auditory Verbal Learning Test. On two separate days, patients responded to the orientation questionnaire and performed one of two versions of a continuous recognition task consisting of two runs composed with the same pictures. In one version, the investigator explained the task at the beginning and recalled instructions once or twice during testing (no-Feedback, 'nFb'); in the other version, a symbol provided feedback on correctness after each item (Feedback, 'Fb'). Task performance was described by a measure of learning in the first run (Item recognition, IR) and a measure of performance decrease in the 2nd run (Temporal context confusion, TCC).

Results: Fifteen patients were disoriented the day of the Fb task and 14 patients the day of the nFB task (cutoff score: ≤15 correct responses). 40 patients had significant memory impairment (Z-score < -1.65 at delayed recall). Orientation was positively correlated with IR and negatively correlated with TCC. Both correlations were stronger in the Fb task (TCC: R= -0.71, p < 0.0001; IR: R= 0.68, p < 0.0001) than the nFb task (TCC: R= -0.59, p < 0.0001; IR: R= 0.54, p

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< 0.0001), though the differences between correlations failed to reach significance.
Conclusions: The results confirm that a failure of ORFi is a strong predictor of disorientation in a sample of non-selected brain-injured patients. To provide immediate and repeated feedback during the task slightly, but not significantly increased the reliability of the task. Our findings also show that in a strongly heterogenous group of patients, the association between disorientation and task performance is weaker than what was previously observed in patients matched according to severity of amnesia.
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47 Improving New Word Learning with High-Definition Transcranial Direct Current Stimulation

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Objective: Aphasia is a language disorder characterized by a disability in communication affecting writing, speaking or understanding. Current treatments don't allow the majority of patients to have access to a full recovery and, therefore, aphasia is often chronic. New treatments allowing patients to regain language functions are therefore necessary. Non-invasive stimulation techniques such as Transcranial Direct Current Stimulation (tDCS) are promising but effects remain inconsistent because it is still not known which areas and which neural processes need to be targeted to achieve better language recovery. Naming abilities are most frequently impacted in patients with aphasia and improving their capacity in this specific task is thus particularly relevant. Our project aims to investigate the effects of high-definition (HD)-tDCS combined with new-word learning in healthy participants. We compare stimulation of two regions of interest: left inferior frontal gyrus (IFG) and left temporo-parietal junction (TPJ). We aim to investigate whether modulating functional connectivity (FC) of these regions facilitates learning new nouns or verbs. In view of previous studies, we expect to notice better performance in verb learning with left frontal gyrus stimulation and improved performance in nouns learning with left temporo-parietal junction.
Participants and Methods: Twenty-seven healthy subjects were so far recruited for this ongoing study taking place over three consecutive days. They were randomly allocated to stimulation over either the left IFG, the left TPJ, or sham stimulation.
On day one, subjects performed a naming task, which contained one hundred words represented as drawing. On day two, participants underwent a new-word learning task with rare words concurrently to HD-tDCS for 20 minutes. The final day consisted of a post-test of naming performance. Resting state EEG recordings were obtained on each day before and after the respective tasks.
Results: Results from an intermediate analysis show a tendency that subjects learned more new words in both stimulation conditions IFG (mean 21.6, standard deviation ± 4.43) and TPJ (18.6, ± 9.23) than sham (13.7, ± 8.96), p=0.057. Conversely, there was no difference between the two active conditions in verb, noun, or global learning.
We observed a significant correlation between the change in alpha-band FC at M1 induced by the stimulation and the learning gain. Thus, the more alpha-band FC between the left M1 and the rest of the brain was increased during stimulation and training, the more new words were learned, irrespectively of the stimulation condition.
Conclusions: Based on these encouraging intermediate results, a total of thirty-six subjects will be included and further neuronal analysis are planned. Our neuronal results may suggest that the left M1 may be a better target to facilitate learning as we observed a correlation of FC in motor cortex area with behavior and learning.

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48 Culturally Relevant Behavioral Screener for Mexican Language Parents: Early Development

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Objective: Culturally relevant research has not kept pace with the most rapidly growing ethnic population in the United States (Lopez, 2015).

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Latinos are one of the populations most often overrepresented within the lower socio-economic status level. Factors including lack of resources, language barriers, and educational constraints are obstacles to accessing medical treatment and mental health services, especially for groups such as those with Fetal Alcohol Spectrum Disorder (FASD; Lopez, 2015). Research indicates high financial, emotional, and psychological expenses for society in order to care for people diagnosed with FASD (Centers for Disease Control & Prevention, 2017). It is vital to provide this population with a tool that is culturally sensitive and helps provide appropriate diagnoses and treatment for the family and community with individuals living with FASD.
Participants and Methods: Participants consisted of parents of Mexican and Mexican American heritage living in the United States (n=35) with children ages 6 to 17 years of age (17 boys and 18 girls). Parent-reported 31 children were bilingual (Spanish and English), 2 monolingual English speakers, and 2 monolingual Mexican dialect speakers. The education level of the children varied from 1st grade to 12th grade. Parents reported their children had a strong connection to the Mexican community and were their biological children. Parents' education levels varied, mothers reported achieving elementary to some college education (Med = 10th grade); and fathers reported higher education from elementary to completing college (Med = 10th grade).
A packet, including a letter of explanation, informed consent, the Child Behavior Checklist, Spanish Version (CBCL; Achenbach & Edelbrock, 2000), and the Spanish FAS BeST deVries, 2006), was given in person to volunteers. Participants were provided information about the study and given the option to participate. Parents and guardians signed consent forms and completed the FAS BeST Spanish language, Spanish CBCL , and demographic questionnaires about their children. The investigator collected completed packets at the setting. The primary investigator met with parents for debriefing.
Results: The Spanish FAS BeST was reduced from 52 to 45 by eliminating variables that loaded below .006, thus creating the Culturally Corrected FAS BeST (CCFAS BeST). The CCFAS BeST total scores were not different between boys and girls (p=.29). We completed a factor analysis with the CC FAS BeST with inclusion criteria of loading of at least 0.412. We found 3 factors; EF/Impulse Control, Lack of Insight, and Attention/Focus.
Conclusion: The 3 factors appear to be possible subtests of the CCFAS BeST that may screen for cognitive and behavioral characteristics of FASD for a Mexican and Mexican-American population. Younger mothers reported higher scores for their children for Factor 1. For Factors 2 and 3, the earlier the mother had her first alcoholic drink the higher scores for her children.
Culturally sensitive assessment tools are important in neuropsychology. To adequately assess and provide treatment for the Mexican population we must develop tools like the CCFAS BeST to resources the population.

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49 Gulf War Illness risk is associated with genetic and cytokine expression variability and pesticide exposures

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Objective: There is mounting evidence that CNS inflammatory markers and resultant immune system activation play key roles in the risk and severity of chronic cognitive and health symptoms in Gulf War Illness (GWI). This study investigated the impact of immune genetic variability, demographic, cytokine plasma concentrations and deployment exposures, collectively referred to as predictors, on risk of GWI in 1991 Gulf War veterans.
Participants and Methods: Genetic variability from 22 single nucleotide polymorphisms (SNPs) related to immune system response and

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pain was determined in 210 Caucasian veterans, 176 with and 34 without GWI defined by the Kansas GWI criteria. Demographics and deployment exposures were collated from questionnaires. Cytokine concentrations were examined in plasma samples using commercially available kits. Associations between all predictors and risk of GWI were determined by logistic regression modeling with step-wise approach of model building; factors were added or removed based on Akaike information criterion (AIC) to build the strongest predictive risk model.
Results: All genotypes conformed to Hardy-Weinberg equilibrium. The final GWI risk prediction model included: toll-like receptor 4 (*TLR4*) and interleukin-6 receptor (*IL6R*) genetic variability, interleukin-15 (IL-15) cytokine plasma concentrations, enlisted rank, skin exposure to pesticides cream or spray and life-time occurrence of post-traumatic stress disorder (PTSD). More specifically, variant *TLR4* and *IL6R* alleles, high IL-15 plasma concentrations, and officer rank were associated with a significantly decreased risk, whilst skin exposure to pesticide cream or spray for > 7 days and occurrence of life-time PTSD was associated with a significantly increased risk (all $P < 0.05$).
Conclusions: GWI is a chronic CNS disorder that is associated with multiple predictive factors, some of which are inborn and some linked to deployment and life-time exposures. We are currently extending our analysis to determine links between predictors using Bayesian Network Modeling and cognitive and health outcomes.

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50 Self-Reported Sleep Quality and Cognitive Outcomes in US Veterans with Gulf War Illness

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Objective: After more than 30 years post-deployment, two thirds of deployed Gulf War (GW) veterans are still experiencing pain, fatigue, poor sleep quality, as well as gastrointestinal and cognitive problems classified as Gulf War Illness (GWI). Sleep quality refers to sleep duration, sleep onset latency, sleep efficiency, wakefulness after sleep onset and daytime sleepiness. Poor sleep quality is linked to multiple health problems, including cognitive impairment. The objective of this study was to compare sleep quality in GWI cases vs healthy GW controls and to correlate self-reported sleep quality with cognitive outcomes in GWI cases.
Participants and Methods: The study population consisted of 256 US 1991 GW veterans. 211 veterans met criteria for GWI as part of the Boston GWI Consortium. Sleep quality and other outcomes were self-reported using the validated PSQI scales. Sleep quality was assessed by a self-report measure including the Pittsburgh Sleep Quality Index (PSQI), a widely used metric in clinical and research settings. Neuropsychological assessments included the California Verbal Learning Test (CVLT II), Trail Making A and B, the Conners Continuous Performance Test (CPT 3) and the Delis-Kaplan Executive Function System (DKEFS) Color-Word Interference Test. The PSQI queried about sleep habits including sleep duration, frequency of wakefulness, frequency of sleep aids, snoring, sleep apnea, and restlessness. Comparisons were made between GWI cases and controls for PSQI scores. Spearman correlation coefficients were adjusted for age, education and sex and were computed for the association between PSQI measures and cognitive outcomes in GWI cases.
Results: Among 256 GW veterans (197 GWI cases, 45 controls), 89% reported some measure of poor sleep quality. GWI cases reported significantly higher PSQI total scores than controls ($p<0.001$). Within the GWI cases, PSQI total score was significantly correlated with a slower Trails B total time. PSQI higher sleep disturbance was correlated with slower Trails B time and with increased CPT3 omission errors and DKEFS Color-Word Interference Trial 4 total time ($p<0.05$). PSQI sleep latency was significantly correlated with Trails B and CPT3 omission errors ($p<0.05$). Increased PSQI sleep dysfunction was correlated with increased DKEFS Color-Word Interference Trial 4 time ($p<0.05$). Taking sleep medication was also correlated with less DKEFS Color-Word Interference Trial 3 errors ($p<0.05$). This pattern

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of PSQI subdomain scores and cognitive outcomes was not seen in the control participants.
Conclusions: GWI cases were shown to have qualitatively more sleep problems including getting to sleep, staying asleep, sleep quality and use of medications than healthy controls. In addition, in GWI cases with sleep problems, decrements were found in executive function, attention and processing speed. These results indicate the need for careful assessment and treatment for sleep disorders in veterans with GWI.

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51 Performance Validity Testing in Alcohol-related Cognitive Disorders

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Objective: Performance validity tests (PVTs), such as the Amsterdam Short-Term Memory (ASTM) test, the Visual Association Test-Extended (VAT-E) or the Test Of Memory Malingering (TOMM), can be used to detect insufficient mental effort as part of neuropsychological assessments. Although they are intended to be valid even in patient with actual cognitive deficits, studies have found that moderate to severe memory impairments may hamper the performance on PVTs. This is relevant in the neuropsychological assessment of patients with chronic and excessive alcohol use that may result in various degrees of cognitive impairment, and in which (episodic) memory is often affected, especially in individuals with Korsakoff's syndrome. The aim of this study was to examine the validity of PVTs (ASTM, VAT-E, TOMM) in patients with moderate to severe alcohol use disorder who were diagnosed with different levels of cognitive impairments (no, mild to moderate, or severe, i.e. Korsakoff's syndrome).
Participants and Methods: A total of 220 consecutive patients from the Korsakoff Centre enrolled in this study. All patients performed one or two PVTs as part of a neuropsychological test battery after an abstinence period of at least 6 weeks. Patients were diagnosed with either Alcohol Use Disorder without cognitive impairment (AUD; N=61), mild to moderate cognitive Alcohol-Related Cognitive Impairment (ARCI; N=99), or severe cognitive impairments due to Korsakoff's Syndrome (KS; N=60). Of these, 81 patients completed the ASTM, 164 patients completed the TOMM and 72 patients completed the VAT-E. Established cut-off scores from the test manuals were used. If the percentage patients performing below this cut-off exceeds 10% (cf. Martin et al., 2020), this is considered indicative for a too high false-positive rate (i.e., reflecting a poor specificity).
Results: On the ASTM, 0% of the AUD patients, 36.7% of the ARCI group and 68.8% of the KS patients performed below the cut-off. On the VAT-E, 0% of the AUD patients, 5% of the ARCI patients and 20% of the KS patients performed below the cut-off on at least one of its subtests. On the TOMM, 1.5% of the AUD, 4% of the ARCI, and 5% of the KS patients performed below the cut-off on trial 2. According to the 10% criterion, the ASTM likely results in unacceptable false positive rates in these patient groups. On the VAT-E, only a too high number of KS patients performed below the cut-off, whereas on the TOMM, none of the patient groups showed unacceptable false positive rates.
Conclusions: Depending on the PVT used, varying below-cut-off performances were found across patients with AUD, ARCI or KS, the highest on the ASTM and the lowest on the TOMM. Consequently, we argue that the TOMM is applicable even in patients suffering from severe cognitive impairments, such as in amnesia due to KS. In turn, the ASTM is not recommended for use in these patients. Finally, caution is needed in the interpretation of VAT-E results.

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52 Absence of Effect of Exenatide on Cognition in Adults with Obesity, Ex-Smokers or Abstinent Alcohol Dependence

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Background: Obesity, smoking and alcohol dependence are major health burdens to society. Overlapping neural mechanisms contribute to overconsumption of food and drugs, and relapse after reduced intake or abstinence, including abnormalities in reward processing and neuropsychological function including risk taking, decision making and impulsivity. The satiety gut hormone, glucagon-like peptide-1 (GLP-1), and its analogues, reduce appetite, food intake and food cue reactivity, and are prescribed effective long-term treatments for obesity. In pre-clinical research, GLP-1 signalling also attenuates consumption and reward related behaviours to alcohol and nicotine, including via actions on mesocorticolimbic dopaminergic pathways, raising potential for GLP-1 analogues as treatment for addictions. In humans, it is unknown whether GLP-1 signalling improves core dopaminergic-dependent neuropsychological components of addiction predisposing to relapse, including memory impairment, risk taking, decision-making and impulsivity.
Objective: To examine the acute effects of the GLP-1 analogue, Exenatide, on these neurocognitive measures in adults with obesity, and abstinent nicotine or alcohol dependence.
Participants and Methods: This study reports secondary neurocognitive outcomes from MRC-funded Gut Hormone in Addiction (GHADD) study (https://clinicaltrials.gov/ct2/show/NCT02690987),a placebo-controlled, double-blind, crossover experimental medicine study, examining effects of acute intravenous infusion of Saline or Exenatide (0.06 pmol/kg/min) in adults with: (i) obesity (BMI >30.0-50.0 kg/m^2) actively dieting (n=24, 71% women,never smoked, without alcohol use disorder, AUD), (ii) nicotine-dependence abstinent ≥6 weeks(n=22, 56% women, ex-smokers without AUD); (iii) abstinent alcohol dependence (AAD) abstinent ≥6 weeks (n=26, 50% women, 46% smoking, 42% ex-smokers). Computer-based cognitive tests were performed 230-270 minutes after start of the infusion: Paired Associates Learning (PAL, visual memory)and Cambridge Gambling Task (CGT, risk taking and decision making) using Cambridge Cognition software (CANTAB), and Stop Signal Task (SST, motor response inhibition). Statistical analysis used repeated measures ANOVA with group (obesity, ex-smoker, AAD) as between-participant and visit (Saline, Exenatide) as within-participant factors, using post-hoc Sidak test.
Results: The groups did not differ significantly in age, sex or years of education. The group with obesity had significantly higher BMI than ex-smokers and AAD groups who had similar BMI. There were no significant main effects of Exenatide (P=0.09-0.94) or visit x group interactions (P=0.08-0.86, post-hoc tests P>0.10) for any neurocognitive measures (PAL: 'mean trials to success', 'memory score', 'stages completed'; CGT: 'risk taking', 'quality of decision making'; SST: reaction time). However, there was a significant main effect of group in PAL for 'mean trials to success' and 'stages completed' (F(2,69)=4.09-3.15, P=0.021-0.049), driven by worse visual memory in AAD than ex-smokers (P=0.017-0.043).
Conclusions: Adults with AAD had impaired visual memory compared to ex-smokers without AUD, consistent with known deleterious effects of excess alcohol consumption on cognition. There was no acute effect of GLP-1 analogue, Exenatide, on visual memory, risk taking, decision making nor motor response inhibition in adults with obesity, ex-smokers or AAD.Although only effects of acute administration were examined in this study and sample sizes were limited, there was no strong evidence supporting potential utility for GLP-1 analogues to improve these neurocognitive functions to help prevent weight regain or drug relapse.

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53 Is Long-Term Cannabis Use Associated With a Decline in Executive Function?

Ana Aquino-Servín[1] , Paola Fuentes-Claramonte[1,2] , Noemi Hostalet[1] , María Ángeles García-León[1,2] , Ana Moreno-Alcázar[3,4] , Lucila Barbosa[1] , Begoña Gonzalvo[5] , Laura Blanco[6] , Diana Bachiller[7] , Anna Romaguera[1,8] , Carlos Roncero[7,9,1] , Peter J. McKenna[1,2] , Edith Pomarol-Clotet[1,2]

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Objective: Cannabis is the most used illicit drug around the world. Although it is often considered a relatively harmless or soft drug, there is clear evidence of poor cognitive performance associated with its use. Memory, attention and executive function seem to be particularly affected, with the effect size for impairment falling into the small or medium range. Impairments appear to be more marked in long-term users.
We aimed to examine: i) whether long-term cannabis use is associated with impaired executive function; and ii) potential associations with years of use and daily intake.
Participants and Methods: Twenty-four heavy cannabis users described as daily users with at least 5 years of use and forty-eight healthy non-users (controls) were included. None of the cannabis users had any more than sporadic use of other drugs, and none had alcohol abuse/dependence. All had been abstinent for at least twenty-four hours before testing. They were assessed with two ecologically valid test batteries, the Behavioural Assessment of Dysexecutive Syndrome (BADS) for executive function and the Rivermead Behavioural Memory Test (RBMT) for memory (specifically long-term memory). Cannabis users and controls were matched for age, sex and estimated IQ based on the Word Accentuation Test (TAP).
Results*:* Mean length of cannabis use was 15.33 years (range 5 to 45) and mean daily use was 3.71 joints per day (range 1 to 8). The cannabis users showed significantly worse performance on the BADS (total score mean 97.42 ± 12.85 vs 107.25 ± 9.236, U= 804.500; p= .006) specially at the subtests Zoo map (U=771.000; p=.015) and the Modified six elements task (U=735.000; p=.014). However, there were no differences between the groups on the RBMT (screening score mean 9.92 ± 1.586 vs 10.44 ± 1.382, U= 683.500; p= .189). BADS total score was significantly correlated with years of cannabis use (rho= -.344, p= .003) even when controlling for the effect of age. There was also a significant correlation with number of joints smoked daily (rho= -.326, p= .006). Years of use and daily intake were significantly correlated (rho= .683, p< .001).
Conclusions: These results suggest that executive but not memory impairment is a complication of heavy, long-term cannabis use. Planning seems to be the more affected executive function. Impaired BADS performance was also associated with years of use, suggesting the possibility of cumulative effects. However, we cannot discard the effect of daily intake, since both variables were correlated.

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54 Tobacco use among older persons in Uganda: Prevalence and Associated factors

Catherine Kyomuhendo[2,3] , Isaac Ddumba[1,2] , Fred Musiige[2]

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Objective: Tobacco use especially in later years threatens the health and wellbeing of older persons. There' dearth of data on the on tobacco use among older persons especially in Sub-Saharan Africa. Hence, the study aimed at highlighting the prevalence of tobacco use among older persons in Uganda.
Participants and Methods: This study was based on the longitudinal study of older persons in Uganda, conducted in two districts. A cross sectional representative population based study, with a sample of 1420 aged 50 years and above were interviewed. Data was analysed using Stata version 14. Logistic regression analysis, adjusted by sex, age and other variables were conducted to determine the factors associated with tobacco use among older persons.,
Results: The prevalence of Tabaco use among older persons in Uganda was 6.4%. Tobacco use was associated with being, older male, (AOR= 1.02, CI 1.00-1.12), older adult residing in rural areas (AOR 1.23, CI 1.064-1.643) and older persons was used alcohol (AOR= 1.13, CI 1.002-2.234). Although not statistically significant as per P-Value, tobacco smoking was associated with self-reporting of Non-

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communicable diseases (NCDs); depression, hypertension, stroke, arthritis and asthma. Cessation of tobacco was much higher in the 72 + years age category, women, those with secondary education, among the urban residents and also the increased levels of income.
Conclusion: Tabaco use among older persons in Uganda was associated with being an older male, rural geographical locations and related NCDs. Majority of the older persons ceased to use tobacco, highlighting the awareness on the public health interventions. Targeted health risk reductions strategies should be emphasized to reduce health risks among older persons in later years.

Symposium 01: Neuro Covid: CrossCultural Considerations and Updated International Results

Chair: Jose A. Muñoz-Moreno
Presenters: Theodore C.K. Cheung, Kalliopi Megari, Joanne Festa, Emilia Łojek, Jose A. Muñoz-Moreno

8:30- 9:50h
Thursday, July 7, 2022

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01 NeuroCOVID SIG Symposium: Cross-Cultural Considerations and Updated International Results

Jose A. Muñoz-Moreno[1] , Theodore C.K. Cheung[2] , Kalliopi Megari[3] , Joanne Festa[4] , Emilia Łojek[5] , Dora Kanellopoulos[6] , Hetta Gouse[7] , Bernice A. Marcopulos[8] , Lucette A. Cysique[9]

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Objective: There is an urgent need to develop rigorous investigation in NeuroCOVID, with neuropsychology as a fundamental pilar of this research. The study of neurocognitive complications is necessary in people with COVID-19 infection because SARS-CoV-2 negatively impacts the central nervous system. Moreover, symptoms may persist over time after the infection. Indeed, Long COVID is a clinically significant syndrome in about 15-20% of people who have had COVID-19, which impacts meaningfully on everyday living and quality of life. Because the pandemic is evolving, there is increasing evidence that NeuroCOVID is a central concern of COVID-19 making the role of the NeuroCOVID INS SIG ever relevant, with the main purpose of providing updated clinical and research resources in this new field of research. For the present INS 2022 Meeting in Barcelona (Spain), the SIG proposes the development of a symposium to point out relevant cross-cultural considerations in the NeuroCOVID field, as well to offer international results on pediatrics, rehabilitation, Long COVID, and a multicenter neuropsychological collaboration.
Participants and Methods: The NeuroCOVID INS SIG was created in April 2020, right after the onset of the globalized progression of COVID-19 pandemic. The group is currently comprised by 142 members, with a broad international representation involving more than 20 countries/regions, and various disciplines in addition to a predominance of neuropsychologists. For the present international meeting, the SIG proposes a symposium to address cross-cultural considerations, as well as the presentation of recent international results on pediatrics, rehabilitation, Long COVID, and multi-center collaborative fields. After an initial introduction, and the subsequent presentation of the works, the event will conclude with a Question & Answer session.
Results: A total of 5 abstracts will be presented in the symposium. All will be exposed by members of the SIG, involving different working subgroups. The works will cover 5 topics of special relevance in the NeuroCOVID

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field currently. First, an initial presentation will point out the relevance of cross-cultural aspects and international collaborations. This will be performed by Dr. Jose A. Muñoz-Moreno (Spain). A second work will offer results about the impact of the pandemic on the mental health of children and youth. This will be presented by Prof. Theodore Cheung (Canada). The third presentation will address cognitive rehabilitation with a special focus on international collaborations. This will be led by Dr. Kalliopi Megari (Greece). In a fourth turn, results from Long COVID neurocognitive profiles will be provided from an American healthcare system. This will be performed by Dr. Joanne Festa (USA). And a last work will be focused on a multicenter project, offering outcomes on a collaborative survey among different countries/regions. This will be presented by Prof. Emilia Łojek (Poland). A final Question&Answer session will be led by Dr. Dora Kanellopoulos (USA), also member of the SIG.
Conclusion: This symposium will provide updated results on NeuroCOVID research, emphasizing the relevance of international neuropsychological collaborations in the assessment of COVID-19-related neurocognitive complications, as well as the necessity of rigorous and revealing results of the effects of COVID-19 infection in the central nervous system.

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02 Inside Out and Upside Down: How COVID-19 Pandemic Has Been Affecting the Mental Health of Children and Youth

Theodore C.K. Cheung[1,2] , Daphne J. Korczak[1,3] , Katherine T. Cost[1] , Evdokia Anagnostou[4,5] , Catherine S. Birken[4,6] , Alice Charach[1,3] , Suneeta Monga[1,3] , Jennifer Crosbie[1,3]

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Objective: Children and adolescents around the globe have been greatly affected psychologically, socially and academically due to loss of family members and friends, access to negative news and misinformation, financial stress, waves of society-wide lockdowns and school shutdowns, social isolation, adjustment to the alternative learning methods, and disruptions of ongoing learning supports and remediation, to name a few. Facing this unprecedented global public health crisis, clinical researchers have been trying to track the trajectories of mental health functioning such as depression, anxiety and traumatic symptoms as a function of this adverse childhood event. Different patterns have been shown among diverse samples in various countries and jurisdictions. Which socioeconomical and psychosocial determinants matter, and how the changes in mental health conditions have been affected coping, learning and social functioning will be reviewed, referencing to a large-scale longitudinal study being conducted in Ontario, Canada.
Participants and Methods: The longitudinal Ontario COVID-19 and Kids Mental health Study sampled over 3000 families and children/youth - including those with or without pre-existing clinical and neurodevelopmental conditions - tracked changes in wellbeing and related factors in parents, children and youth. Latent growth curve analysis was conducted to determine trajectories of depression, anxiety, and irritability, accounting for demographics, child/parent MH, and COVID-19 exposure.
Results: The symposium will highlight a range of study findings including trajectories of mood and anxiety, the impact of screen time, pre-pandemic family level risk factors, and how irritability and resilience of children and youths has changed over time and the association with internalizing and externalizing outcomes.
Conclusions: Children and youth have experienced sustained mental health symptoms during the pandemic. Implications on preventive measures and targeted early interventions will be discussed.

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03 Neurocognitive Rehabilitation of post-COVID-19 Patients: Review of international perspectives

Kalliopi Megari[1] , Rachael Ellison[2] , Sarah H Gulick[3] , Clare Ramsden[4] , Tracy Vannorsdall[5]

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Objective: There is now considerable evidence that COVID-19 can result in neurocognitive symptoms for some patients. Neurocognitive symptoms can be present in the acute phase of COVID-19, most commonly in those people with severe COVID-19 requiring hospitalisation but can also present in the post-COVID phase. Part of our understanding of post-COVID-19 cognitive outcomes comes from our understanding of the cognitive outcomes related to direct CNS damage or the systems that are indirectly affected by COVID-19.
Participants and Methods: There is current evidence of cognitive impairment post-COVID-19 in several cognitive domains including: attention, concentration, memory, working memory, and executive functioning. Compared to control groups, COVID-19 patients may demonstrate cognitive decline and/or weaknesses into the recovery states of the illness. Importantly, the World Health Organization (WHO) stresses that the cognitive, mental health and physical effects of COVID-19 should be addressed by cognitive rehabilitation programs. There is an extensive history and literature regarding effective cognitive rehabilitation strategies, which can be utilized as a basis for providing evidence-based cognitive rehabilitation for people with post-COVID neurocognitive symptoms.
Results: Neurocognitive Rehabilitation interventions may include a combination of individual, group, and community-based therapies, and is a crucial intervention as cognitive disability can reduce an individual's level of efficiency and effectiveness in daily activities and novel situations. However, through the process of education on compensatory strategies and building upon foundational skills, the goal of Neurocognitive Rehabilitation interventions is to improve daily functioning and promote the recovery of cognitive function following any injury that created a clinical level of disability.
Conclusion: This presentation will provide an international perspective of post-COVID cognitive rehabilitation from the International Neuropsychological Society (INS) NeuroCOVID Special Interest Group (SIG). It will explore cognitive rehabilitation strategies that may be useful to improve functional outcomes for these individuals based on the neurocognitive symptoms most commonly reported in the post-acute-COVID phase and outline current and future research in this area.

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04 Neurocognitive Profiles of Adult COVID-19 Long Haulers from a Multi-Center Health System in New York

Joanne Festa[1,2] , Christina Palmese[1] , Allison Navis[1] , Brian Mathew[1] , Sloane Sheldon[1] , Eric Watson[3] , Tina Lee[4] , Georges Naasan[1,2] , Nathalie Jette[1,5]

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Objective: COVID-19 long haulers report a range of cognitive, physical, and emotional symptoms that persist well after the resolution of acute infection. Data regarding neurocognitive sequelae of long-COVID are still emerging and will continue to have a direct global impact on the treatment and rehabilitation of this population. New York City was the initial US epicenter of COVID-19 infection in the global public health emergency. Our multi-center Mount Sinai Healthcare System provided critical care to patients with acute COVID-19 and was the first in the region to develop a Center for Post-COVID Care (CPCC). The World Health Organization has focused on the three "Rs" – recognition, research, and rehabilitation to further the understanding of long-COVID. Post-COVID cognitive difficulties, or "brain fog," have been the most commonly reported symptoms among patients. The INS NeuroCOVID International Neuropsychology Task Force has provided ongoing communication and important literature to the neuro-COVID research community. Our aim was to examine neurocognitive outcomes in people with post-acute COVID-19 syndrome.
Participants and Methods: Our team developed and implemented a common core neuropsychological battery and triaged patients for assessment and treatment of post-COVID-19 across the Mount Sinai Hospital system. Using the core battery adapted for in-office, telehealth, or hybrid model evaluations, we collected socio-demographic data, pre-existing conditions, acute

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COVID-19 illness symptoms, severity and treatments, as well as our primary outcomes measures inclusive of the following standardized measures: the ACS Test of Premorbid Functioning, California Verbal Learning Test, Brief Visuospatial Memory Test, Logical Memory tests from the Wechsler Memory Scale IV, subtests from the Wechsler Adult Intelligence Test IV, Color-Word Interference Test from the Delis-Kaplan Executive Function System, Wisconsin Card Sorting Test, Trail Making Tests (oral version), Symbol Digit Modalities Test (oral version), verbal fluency tests (COWA and animals), Rey Complex Figure Test (copy only), Beck Depression Inventory, Beck Anxiety Inventory, and Fatigue Severity Scale.

Results: The symposium will present the unique profiles of long-COVID patients from a large multicenter health system that was the epicenter of the pandemic in early 2020. We will present demographic, medical, cognitive, and psychosocial variables in long haulers and examine the relationship between these variables and cognitive outcomes. Depression, anxiety, fatigue and COVID sequelae such as POTS (postural orthostatic tachycardia syndrome) are anticipated to play a significant role in cognitive long-hauler syndrome. We will compare these against long-COVID findings previously reported by our international colleagues.

Conclusion: Adult COVID-19 long haulers continue to experience neuropsychological and emotional symptoms well beyond the resolution of acute infection. Our project highlights the relevance of neuro-COVID investigations for the international community and will inform future efforts to harmonize global assessment methods. Understanding the cognitive and psychological profiles of COVID-19 long haulers will facilitate and optimize treatment and rehabilitation in this population.

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05 Olfactory and Neurocognitive Function in Adult COVID-19 Survivors. A Multi-Center Study Online

Emilia Łojek[1] , Lucette Cysique[2] , Anna Rita Egbert[1] , Ewa Malinowska[1] , Bernice Marcopulos[3] , - the NeuroCOVID Working Group[1]

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Objective: Persistent cerebral abnormalities are reported, especially in the olfactory and functionally related brain structures, in people who have had olfactory and taste disorders in the acute phase of COVID-19. However, the relationship between olfactory/taste disturbance, brain abnormalities, and post-covid-19 cognitive functioning remains unclear. This study aimed to examine the relationship between olfactory/taste disturbance due to COVID-19 and cognitive functioning after disease. The current study is part of a larger on-going longitudinal research project designed in accordance to the recommended neuropsychological assessment protocol for prospective research in COVID-19 pandemic (Cysique, Łojek et al., *JINS, 2021, 1-9*).

Participants and Methods: The study addressed Polish, English, Ukrainian and Russian language speakers and included three phases of measurements. At baseline participants filled out an online self-reported survey that assessed pre-COVID health state, COVID-19 related symptoms, complains on cognitive functions, depression, anxiety, PTSD, social and lifestyle factors.Next, the Brief Test of Adult Cognition by Telephone (BTACT, versions C, D) was administered twice: within a month and then four months after the baseline. A total of 1038 individuals filled out the online survey (86% in Polish, 11% in English and 4% in Ukrainian/Russian), included 473 who tested positive for SARS-CoV-2 (COVID+). Within the collected COVID+ sample (N=473), 51% of participants indicated experiencing symptoms of smell and/or taste disturbance (ST+ group N=242). Of those, 83 COVID+ Polish participants who completed two over-the-phone neuropsychological assessments (i.e., baseline and 4-month follow-up) were entered into final analysis on the relationship between olfactory/taste disturbance and cognitive function. Those 83 COVID+ participants included 50 ST+ participants and 33 individuals who did not indicate such problems (ST-). ST+ vs. ST- groups were comparable on age (M=39, SD=12 years), sex (73% females), education (79% higher education) and number of participants hospitalized due to COVID-19 (18-15%).

Results: The results of the baseline survey showed that hospitalization and emotional disorders and were of significant importance for the severity of subjective complaints on cognitive dysfunctions after COVID-19. Individuals who indicated experiencing symptoms of smell and/or taste disturbance

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were at an elevated risk of showing difficulties in inductive reasoning (measured with the BTACT Number Series Test) as compared to individuals who did not experience smell and/or taste disturbance at baseline (B=-1.916, p=0.049, 95%CI= -3.825, -0.006). These effects were observed in the most comprehensive regression model accounting for age, sex, and depressive symptoms. These effects were present in the first assessment persisted at the 4-month follow-up at a statistically trending level (B=-1.785, p=0.060, 95% CI= -3.648, 0.078). The cross-cultural factor did not have a significant influence on the obtained results. **Conclusion:** The study indicates that taste/smell disorders in individuals after COVID-19 may be associated with chronic difficulties in performing complex cognitive tasks requiring the simultaneous involvement of memory, information processing and abstract thinking. These data also highlight an urgent need to implement neuropsychological assessment that includes olfactory/taste as a sensitive and culturally-free measure that may aid international comparisons of neurocognitive functioning in COVID-19 survivors.

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06 Relevant Cross-Cultural Aspects in NeuroCOVID: Primary Considerations from the NeuroCOVID INS SIG

Jose A. Muñoz-Moreno[1] , Hetta Gouse[2] , Emilia Łojek[3] , Bernice A. Marcopulos[4] , Lucette A. Cysique[5]

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[4]Department of Graduate Psychology, James Madison University, Harrisonburg, USA
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Objective: The advent of COVID-19 with its concomitant neurocognitive consequences has highlighted the importance, and also the shortcoming, of neuropsychology practice across diverse international settings. For the successful and continuing development of neuropsychology globally, appropriate cross-cultural practice is needed. Aspects such a cultural validity of stimuli, linguistic adaptation and translation of tests, appropriate normative data, and access to assessments and interventions in low- and middle-resource settings must be improved in order to facilitate provision of services and research. This presentation will review NeuroCOVID relevant cross-cultural issues, following a practical approach, and will provide potentially useful recommendations for both research and clinical practice.
Participants and Methods: The NeuroCOVID Cross-Cultural Working Subgroup is one of the 10 subgroups under the NeuroCOVID INS SIG Group. This subgroup is comprised of 20 researchers from 7 countries and 4 continents. In this presentation, we will first provide a brief update of the NeuroCOVID literature and present some of the most recent research findings and recommendations for assessment and interventions. We will address 3 areas specifically: 1) neuropsychological cross-cultural aspects of relevance, 2) potential limitations and obstacles to pursue a culturally diverse approach, and 3) potentially useful recommendations to integrate cross-cultural features in neuropsychological research and clinical practice in the setting of NeuroCOVID.
Results: NeuroCOVID presents unique challenges, such as the eventual need to determine diagnostic criteria, the necessity of teleneuropsychology to assess infectious patients and those with no easy access to clinical services, interventions that might be appropriate for widely different patient populations (e.g., younger people with Long COVID and the elderly with dementia-like symptoms), and preventative strategies such as education on vaccination and social barriers to limit (re)infection. All these considerations are further complicated by cross-cultural assessment challenges. The literature on cross-cultural neuropsychology is expanding, providing insight into the challenges and relevant issues in this new domain of neuropsychology. With the recent advent of global COVID-19 pandemic, there is a need to focus cross-cultural aspects on NeuroCOVID, specifically with regard to how to address variability in education and literacy across diverse settings, differing cultural traits that may impact test response, neuropsychological test availability, test translation and other linguistic challenges, ecological validity of tests, and socio-economics aspects related to the populations assessed. Other additional obstacles include economic difficulties in some settings, constraints by limited development of test and norm in low-

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and middle-income countries, paucity of normative data outside of high-income countries, and lack of measures that are sensitive to mild neurocognitive impairment. Practical recommendations may be provided with the main purpose of addressing some of those challenges, including how to adapt neuropsychological test batteries to meet population needs, how to establish and identify harmonization levels for multi-site studies based on neuropsychological resources, and how to work to enhance global collaboration among international clinical and research groups. **Conclusion:** Considering neuropsychological cross-cultural aspects when assessing for or intervening in NeuroCOVID is essential. These aspects build on traditional neuropsychology, but with the reality of COVID-19, there are urgent issues that need considerations to improve neuropsychology uptake globally.

Paper Session 04: New approaches to Cognitive rehabilitation

8:30- 9:50h
Thursday, July 7, 2022

01 Cognitive Remediation & Personalized treatment with the NEAR method

Lindsay Brenugat[1] , Aliénor Maître[1] , Louise Pechaud[1] , Brigitte Malangin[1] , Bérangère Rigaut[1] , Charlotte Danset-Alexandre[1] , Mauricette Mendy[1] , Isabelle Amado[1] , Mona Moualla[1]

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Objective: Cognitive disorders are very common in psychiatry and drug treatments or psychotherapies have little or no therapeutic effect. However, studies show that once the clinical symptomatology is stable, cognitive difficulties mainly influence good functional outcome for rehabilitation. Hence, cognitive remediation (CR) has been broadly developed in French psychiatric services as a psychosocial therapy associated with rehabilitation and supported employment. CR aims to improve cognitive functioning and thus reduce the consequences in daily life for people with psychic handicap (PH), mainly schizophrenia. CR improves autonomy, quality of life and permits a concrete realization of projects such as work or studies or even psychosocial reintegration. However, cognitive alteration profiles are very heterogeneous in terms of severity of cognitive disorders, but also according to cognitive functions that may be impaired within the same psychiatric pathology. Moreover, the transfer of knowledge acquired through RC is a major challenge for teams working in rehabilitation. Studies showed that 2 key points favoring this transfer of competence are : 1) implementation of a personalized treatment 2) integration of this treatment in a global rehabilitation project. The NEAR method (Neuropsychological Educational Approach to Remediation (Medalia & Saperstein, 2009, 2017) is a CR program built around these two elements and acquires qualities and enrichment of a group treatment.
Participants and Methods: In order to prove efficiency with the French adaptation of this method, we carried out multidisciplinary evaluations (clinical, neuropsychological & functional) with 102 people suffering from PH (schizophrenia, autism spectrum disorders, and other neurodevelopment disorders) before and after NEAR program.
Aims were i) to study the effect of RC on the whole group on clinical, neuropsychological and functional dimensions; ii) to see if we observe different effects according to the targeted cognitive objectives on these 3 axes. We performed pairwise t-test analyses with Bonferroni correction by comparing the before-and-after scores and then according to the targeted cognitive objectives. 5 objectives were chosen : processing speed, attention, working memory, long-term memory, executive functions.
Results: The results showed that both clinical, neuropsychological and functional dimensions were improved. On the other hand, we also observed different effect profiles according to the targeted cognitive objectives. In addition, systematic effects on attentional capacities were found. Also, people who targeted working memory as cognitive objective had an improvement in overall neuropsychological functioning. Finally, we observed that improvement of attentional, executive and working memory capacities were most

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associated with improvements of clinical symptomatology.
Conclusion: Thus, our results support effectiveness of the NEAR- French adaptation program in improving functioning for the participants. Near was delivered in an individualized manner while assessed in group setting. Moreover, it seems that targeting working memory as cognitive aim allowed improvement in neuropsychological functioning more broadly. Improvement in attentional, inhibition and working memory abilities were more associated with clinical improvement. Thus, although these initial results needed to be confirmed and these associations needed to be characterized, that confirms the importance of proposing personalized treatment in the rehabilitation process and brings evidence that NEAR method can provide this approach.

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02 A Usability Study of a Game-Supported Goal Management Training for Brain-Injured Individuals

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Objective: Computerised cognitive training (also named 'brain training' or 'serious gaming') has become popular as an intervention for brain-injured individuals. Many existing brain trainings adopt a restorative approach, aiming to strengthen cognitive functions rather than to practice compensatory strategies although this latter type of treatment is recommended as a practice standard. For this reason, we developed a game set that trains an evidence-based compensatory strategy (i.e., Goal Management Training [GMT]) for executive dysfunction. The game set contains a collection of mini-games in which patients learn to utilize the GMT strategy in multiple executive function exercises in combination with a mobile application that serves as a tool to regain control during the performance of executively demanding daily activities. Designing games based on compensation strategies involves additional challenges as patients must be able to generalize the trained strategy to daily activities. Therefore, the objective of this study was to establish how design choices were made to enhance the usability of the game set designed to train the GMT strategy.
Participants and Methods: We used a standardised step-by-step methodology widely used in the development of serious games. The design of the game set was evaluated at several stages during the development to ensure that all the objectives were met. First, the target audience and user characteristics were identified through experts in the neurorehabilitation field (*N*=5). Second, the designers developed a paper prototype. The usability of the paper prototype was evaluated by the same experts and by think-aloud sessions with a focus group consisting of brain-injured individuals (aged 24-70 years) with executive complaints (*N*=30). Once we updated the paper protype with the feedback, the programmers developed a first digital prototype which was optimized using an iterative approach containing in-house testing, testing in the target group, focus group sessions and multidisciplinary think-aloud sessions. In each developmental iteration, we listed explicit problems and specific design suggestions, and quantified the usability by the System Usability Scale (SUS) completed by brain-injured individuals (*N*=22).
Results: The iterative development process led to the identification of specific problems in the game set, and provided additional insights into the problems that brain-injured individuals encountered. Young and older brain-injured individuals (*N*=22) with executive complaints evaluated usability of the final game set on the SUS [0-100] as high (Mean=85.8 [range: 67.5 to 97.5]). All brain-injured individuals quickly grasped how to use the game set, felt self-assured while playing, and reported that they would use the game set frequently.
Conclusion: In summary, the present study aimed to establish the design choices we made to enhance the usability of the game set. Based on the feedback and SUS questionnaire, the results suggest that our game set is adequate for utilizing the GMT strategy in a user-friendly approach for brain-injured individuals. The feedback and appropriate features determined were adopted in the game set for further implementation purposes. We are currently evaluating the game set supported GMT in a randomized controlled pilot study in brain-injured individuals referred for outpatient cognitive rehabilitation.

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03 Influence of Premorbid IQ on the MCT Efficacy: a Recent Onset Psychosis Study

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Objective: Low premorbid IQ in psychosis has been considered as a morbid manifestation that predicts poorer outcome (Ayesa-Arriola et al., 2018). A generally lower verbal intelligence may interfere with the ability to think about others because of difficulties of readily grasping the meaning embedded in the speech of other people (Nicolo et al., 2012). It has been suggested that some level of cognitive functioning is necessary for a level of metacognition to be achieved over time (Kukla & Lysacker., 2020). The main objective of this study is to analyse the influence of premorbid IQ on the effectiveness of MCT in recent onset psychosis patients, in terms of psychopathology, metacognition, and social functioning.
Participants and Methods: A total of 110 patients experiencing a recent onset of psychosis were randomized to an MCT or a psycho-educational (PE) intervention with cognitive-behavioral elements (ID:NCT02340559). Each group received eight weekly sessions and was assessed in three time-points (baseline, post-treatment, and at 6 months follow-up) with a comprehensive battery of instruments including measures of socio-demographic and clinical variables, metacognition and social functioning. The evaluator was blinded to the condition of the patient. Measures of change after MCT or psycho-educational intervention in each dependent variable (psychopathology, metacognition and social functioning) were calculated. Premorbid IQ was categorized as low and high premorbid IQ according to mean in each intervention group. General linear models were carried out to assess effectiveness of interventions in each dependent variable using categorized premorbid IQ as a covariate.
Results: A total of n=60 patients received PE intervention ($M_{premorbid\ IQ}$=95.10, DS=13.65) and n=50 MCT intervention ($M_{premorbid\ IQ}$=97.03, DS=15.41). A significant interaction effect (intervention x premorbid IQ) was found in measures of change of BCIS self-certainty [F=5.799, p< 0.018, eta=0.068] at post-treatment, disorganized symptoms [F=5.246, p< 0.025, eta=0.074] and interpersonal communication [F=4.585, p< 0.036, eta=0.060] at 6 months follow-up. In low premorbid IQ group, disorganized symptoms [PE: M=0.14, DS=3.50 vs. MCT: M=-2.05, DS=2.27] and interpersonal communication [PE: M=-1.80, DS=11.38 vs. MCT: M=6.74, DS=12.24] improved more in the MCT group than in the PE group, at 6 months follow-up. However, regarding high premorbid IQ, BCIS self-certainty [PE: M=0.95, DS=2.92 vs. MCT: M=-2.32, DS=2.86] improved more in the MCT group than in the PE group. In low premorbid IQ group, no changes were observed in terms of cognitive insight in both intervention groups.
Conclusion: Premorbid IQ has an impact on the effectiveness of MCT vs. PE. Improvements in metacognitive processes require a higher premorbid IQ for them to occur. A poorer cognitive performance could lead to difficulties in the ability to think, concentrate and learn, being an important obstacle for the implementation of MCT. In this sense, a combination of cognitive remediation therapy +

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MCT could, thus, be particularly beneficial for individuals with psychosis.

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04 Evidence on Language Rehabilitation Combined with Online Exercises. A Pilot Study with BLAPP.

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Objective: When a language disorder is due to developmental delay or follows brain injury, intensive and long-lasting rehabilitation is needed. Insufficient sanitary resources cause therapies not to be as intensive and long lasting as required. We designed Blapp, a gamified speech and language disorders home rehabilitation platform for paediatric patients to support face to face therapy. Blapp counts with voice recognition, allowing an autonomous work by kids themselves, and both comprehensive and expressive language exercises.
Participants and Methods: We compared the outcome of language therapy with and without Blapp support in 20 patients from 6 to 12 years old. Eight patients had language disorder following brain injury, 12 patients had neurodevelopmental disorders.
A clinical trial with a two-periods crossover design was conducted. Each testing condition lasted 6 weeks. Blapp condition consisted on 1 day per week language therapy session plus 4 days per week training with Blapp; no-Blapp condition consisted on 1 day per week language therapy session plus 4 days per week training with exercises prescribed by the therapist. Assessment was carried out before and after every condition with subtests of CELF-V, Vineland and retell. We measured adherence and satisfaction.
Results: We used results free of carry-over effect (first period). We obtained better results in the Blapp condition in 6 of the 13 language variables without reaching statistical significance. Adherence grew in 15% in the Blapp situation and satisfaction grew in parents but not in patients.
Conclusions: Findings suggested useful benefits of utilizing Blapp in language rehabilitation enhancing engagement and adherence, increasing access to more intensive therapies and improving rehabilitation outcomes. Further investigation is needed.

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05 Dosage Matters in Prism Adaptation Treatment for Improving Spatial Neglect and Stroke Rehabilitation Outcome

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Objective: Prism adaptation treatment (PAT) is recommended by multiple guidelines for treating spatial neglect (SN) in stroke rehabilitation care based on results of independent clinical trials and meta-analyses. However, effectiveness of PAT in real-world clinical practice is unclear. In 2014, we initiated a multi-site implementation practice-based project to improve SN care during inpatient rehabilitation. Trained occupational therapists implement the recommended, standardized SN assessment and treatment protocols in usual and standard care. The present study retrospectively reviewed clinical records with the objective to examine whether a greater number of PAT sessions would predict better SN improvement and rehabilitation outcomes in stroke patients.
Participants and Methods: Clinical records from 16 U.S. rehabilitation hospitals across 11 states were reviewed. In those facilities, occupational therapists were instructed to 1) assess all neurological patients for SN using the Catherine Bergego Scale (CBS) via the Kessler Foundation Neglect Assessment Process (KF-NAP®), 2) if SN was detected (CBS > 0), provide PAT once daily for 10 sessions following the Kessler Foundation Prism Adaptation Treatment (KF-PAT®) procedures, and 3) assess patients for SN again after PAT. After excluding outliers based on the length of stay, 444 patients (49.5% female; median age=70yr, IQR=61-78) who received PAT were included for the analysis of SN improvement using CBS Change, and 1465 patients (49.2% female; median age = 70yr, IQR=62-80), receiving PAT or not, were included for rehabilitation outcome analyses using Function Independent Measure (FIM®) Gain based on the Total FIM, Motor FIM, and Cognitive FIM scores.
Results: A multiple regression was run to determine the impact of PAT sessions on CBS Change when added to a predictive model

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including age, sex, CBS at admission, neglected side of space, time between stroke and admission, and length of stay. Results from the model indicated that every PAT session completed predicts 0.17 improvement in CBS score, 95%CI=.050-.290, p= .006. Visual examination of CBS Change by number of sessions indicated a more prominent linear relationship between session attendance and gains in patients attending ≤8 sessions. A post hoc multiple regression analysis revealed that PAT frequency (ideally one session daily) predicted CBS Change among patients with >8 sessions (n=170; 38%) but not among patients with ≤8 sessions (n=274; 62%). Regarding FIM, we performed three separate regression models including the same factors as mentioned above and adding FIM at admission as a covariate. Results showed that every PAT session completed predicts 0.37, 0.26, and 0.14 improvement in Total FIM, Motor FIM, and Cognitive FIM scores, respectively. However, PAT frequency was not predictive of any FIM Gain in patients with >8 sessions.
Conclusions: Receiving more once-daily PAT sessions was associated with greater improvement in SN as well as rehabilitation outcomes in terms of functional independence. In addition, receiving PAT at a higher frequency (i.e., fewer days between two sessions) for more than 8 sessions predicted better SN improvement. The study provided practice-based evidence that PAT is effective and appropriate for stroke patients in the inpatient rehabilitation setting.

Paper Session 05: Assessment and treatment response in TBI

8:30- 9:50h
Thursday, July 7, 2022

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01 "Its Not Only The Injury But Also the Kind of Head." Factors Influencing Outcome after TBI

Jennie Ponsford[1,2] , Marina Downing[1,2]

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Objectives: Traumatic brain injury (TBI) has significant physical, cognitive, behavioural and emotional consequences that continue over many years and impact return to functional independence, work. study and psychosocial reintegration. Various factors have been associated with outcomes post-TBI, including injury severity variables, age and education. However a significant amount of variance in outcomes remains unaccounted for. Relatively few studies have included a comprehensive range of pre-injury factors as predictors in large samples. This study aimed to examine factors associated with functional outcome at one year after moderate-severe TBI, including pre-injury and injury-related factors
Methods: 1028 participants (71.6% males) were recruited prospectively into a Longitudinal Head Injury Outcome Study and followed up at one year post-injury. They had a mean age at injury of 36 years (SD=18.39 years), mean education of 11.3 years (SD=2.48 years), mean days in PTA 26.98 days (SD=30.68 years), mean GCS score of 8.29 (SD=4.35), 64.9% were single, 15.6% were from a culturally and linguistically diverse (CALD) background, 19.5% had psychiatric issues pre-injury and 17.6% had alcohol issues pre-injury. Functional outcome was measured one year post-injury using the Glasgow Outcome Scale – Extended (GOSE). Scores of 1-6 were combined to represent 'poor recovery', and scores of 7 and 8 represented 'good recovery'. Variables examined as predictors included sex, age at injury, years of education, being from a CALD background, marital status at injury, pre-injury psychiatric disorder, pre-injury alcohol issues, days in PTA, and presence of spinal, chest, abdomen, limb, or facial injuries at time of TBI. Binary logistic regressions were conducted to examine factors associated with good recovery on the GOSE at one year post-injury.
Results: At one year post-injury, good recovery, representing return to previous activities on the GOSE (Score 7-8), was present in 32% of participants. This was significantly associated with: more years of education (p=.005), not being from a CALD background (p=.03), less days in PTA (p<.001), not having psychiatric issues pre-injury (p<.001) and absence of spinal (p=.01) abdomen (p=.008), and limb injuries (p<.001).
Conclusions: Functional outcomes are determined as much by pre-injury background as they are by injury-related factors. Consideration of such factors may inform prognostication and rehabilitation planning.

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02 Advances in the Use of Eye Tracking for Neurocognitive Assessment of TBI among U.S. Military Personnel

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Objective: To evaluate the potential use of eye tracking for assessment of neurocognitive status after traumatic brain injury (TBI) among U.S. military personnel.

Participants and Methods: The Fusion Brain Assessment System is an automated system developed by the research team to evaluate saccadic eye movements, manual button presses, and pupillary responses from patients while they complete cognitive tasks. A series of studies (total n=351) were conducted to evaluate the use of Fusion neurocognitive eye tracking tasks in individuals with mild TBI (mTBI), moderate and severe TBI (msTBI) and uninjured controls. In all studies, participants completed Fusion tasks, a structured TBI diagnostic interview, and a battery of standardized neuropsychological tests. *Study 1* included n=98 adults (n=54 controls; n=27 mTBI; n=17 msTBI) who completed the Bethesda Eye and Attention Measure (BEAM) using Fusion v1 (desktop PC prototype). *Study 2* used BEAM on Fusion v1 to identify markers of test validity among n=50 healthy participants, including n=24 instructed to "fake bad" and n=26 instructed to provide "best effort." In *Study 3,* n=20 mTBI, n=15 msTBI, and n=27 controls completed the Fusion v1 n-Back task. In *Study 4,* Fusion v2 (Laptop prototype) n-Back results were compared between n=51 mTBI and n=33 controls (all military personnel and Veterans). *Study 5* examined psychometric characteristics of Fusion v2 BEAM among n=57 military personnel with remote mTBI.
Results: In *Study 1*, BEAM demonstrated sensitivity to multiple cognitive processes, with split-half reliability of .74 to .89 for key saccadic metrics. mTBI participants were more likely to be impaired on saccadic metrics than controls. Practice effects at one week were non-significant, and saccadic response time (RT) was not significantly impacted by education or intelligence.
In *Study 2,* BEAM saccadic and manual metrics showed outstanding accuracy in classifying "fake bad" vs. "best effort" (AUC=0.93) as well as "fake bad" vs. mTBI (AUC=0.91).
In *Study 3*, n-Back saccadic RT demonstrated a dose-response relationship across control, mTBI and msTBI groups—particularly at high levels of cognitive load.
In *Study 4*, n-Back saccadic and manual metrics were complementary, with combined predictive power of PPV=.78, NPV= .72, r^2=.44 for classification of remote mild TBI vs. controls. N-Back metrics also predicted overall performance on the neuropsychological battery.
In *Study 5*, BEAM metrics were highly correlated with conventional measures of visual attention, processing speed, task switching, working memory, and executive functions. BEAM saccadic RT consistency was strongly predictive of impairment on the neuropsychological battery, with AUC=.81, p<.001, and sensitivity/specificity of .81/.83.
Conclusions: These validation studies provide robust support for use of Fusion Brain Assessment System as a tool for automated assessment of cognitive and oculomotor performance in U.S. military personnel. Overall, results demonstrated that the Fusion system measures multiple different cognitive and oculomotor processes, and has strong test reliability with minimal practice effects, high sensitivity to effects of TBI, minimal influence from demographic factors, effective embedded validity metrics, and rapid administration time. Continued efforts are underway to transition the Fusion system to a head-mounted virtual reality (VR) platform, obtain medical regulatory clearances, and begin clinical implementation.

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03 A Qualitative Exploration of the Long-Term Journey After Traumatic Brain Injury

Jennie Ponsford[1,2] , Aviva Lefkovits[1,2] , Amelia Hicks[1,2] , Marina Downing[1,2]

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[2]Monash Epworth Rehabilitation Research Centre

Objective: Previous studies examining life after traumatic brain injury (TBI) have taken a predominantly short-term and quantitative perspective, with generally narrow focus, and have not specifically investigated changes in experience over time post-injury to gain a uniquely long-term perspective. This study therefore aimed to qualitatively explore the

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broad long-term experience of living for 10 years or more with moderate to severe TBI.
Participants and Methods: Thirty participants (60% male) aged 35 to 86 (m = 56 years, SD = 15) who were on average 22 years post moderate to severe TBI (range=10-31 years) were purposively sampled from a Longitudinal Head Injury Outcome Study database. They completed semi-structured interviews investigating the impact of TBI on various life domains, the rehabilitation experience and support received, and overall perspectives of the long-term journey after TBI. Data were analysed using Braun and Clarke's six-stage thematic analysis.
Results: Results demonstrated that: a) although some participants reported full recovery, several experienced persistent physical, cognitive and emotional problems that impacted their independence, employment and interpersonal relationships; b) early rehabilitation was very helpful, but some participants experienced difficulties accessing ongoing services; c) family and social support were crucial to recovery; d) most participants drew upon inner strength to find positives in their experience.
Conclusions: These findings have identified factors that facilitate and impede long-term recovery from TBI, which may inform better support and care for injured individuals over the years after injury to improve their quality of life.

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04 Evaluation of a Novel Treatment for Persistent Post-Concussion Symptoms After Mild Traumatic Brain Injury

Jack V.K. Nguyen[1] , Adam McKay[1,2] , Jennie Ponsford[1,2] , Katie Davies[3] , Michael Makdissi[4,5] , Sean P.A. Drummond[1] , Jonathan Reyes[1] , Jennifer Makovec Knight[1] , Tess Peverill[3] , James H. Brennan[4,5] , Catherine Willmott[1,2,5]

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[2]Monash-Epworth Rehabilitation Research Centre, Melbourne, Australia
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Objective: Given that multiple factors are thought to contribute to persisting post-concussion symptoms (PPCSs) after mild traumatic brain injury (mTBI), current clinical guidelines emphasise an interdisciplinary approach to concussion management. Research into the efficacy of interdisciplinary treatments, however, is in its infancy. This study aimed to evaluate the feasibility and preliminary efficacy of a novel interdisciplinary intervention that incorporates neuropsychology, physiotherapy, and medical treatments to reduce PPCSs severity.
Participants and Methods: A non-concurrent single-case experimental design with one- and three-month follow-up and randomisation to multiple baseline lengths (2, 4, or 6 weeks) was repeated across fifteen participants (53% female) with mTBI (mean age=38.27 years (SD=15.68), mean time since injury=112.33 days (range=30-373 days)). The 12-week treatment, iRECOveR (Interdisciplinary REhabliatation for COncussion Recovery), incorporated goal-setting, psychoeducation, activity scheduling, anxiety management training, and sleep intervention, within a cognitive behavioural framework, as well as medical review and management, and movement, exercise, and manual therapy targeted towards oculomotor, vestibular, cervical, and autonomic systems. Target behaviour was severity of post-concussion symptoms, assessed via the Rivermead Post-Concussion Symptoms Questionnaire, three times weekly during baseline and treatment phases. Secondary outcomes included measures of mood, sleep and fatigue, physical functioning, health-related quality of life, and illness perceptions. Primary and secondary outcomes were assessed at baseline, pre-treatment, post-treatment, and one- and three-month follow-up. Goal attainment scaling (GAS) was used during the treatment to measure personally meaningful goals. Feasibility of the intervention was measured by recruitment and retention rates, treatment adherence, proportion of completion of treatment sessions, and rates of engagement with weekly homework. Data were analysed visually and statistically. Participant experiences of the trial were explored through qualitative interviews.
Results: iRECOveR was found to be feasible in terms of engagement. For preliminary efficacy, analysis of the initial 12 cases showed moderate-large effect sizes in reducing PPCSs in 10/12 cases, although only five reached statistical (Tau-U) and clinical (visual analysis) significance. These improvements were maintained at 1- and 3-month follow-up and were accompanied by reductions in fatigue, sleep difficulties, symptoms of depression, anxiety, and stress, and illness perceptions. All

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those who completed treatment and did not show statistically significant improvement in PPCSs across phases, demonstrated clinically significant improvements in at least one secondary outcome, with seventy-five percent of individual therapy goals achieved using GAS.
Conclusions: Results suggest that iRECOveR may reduce PPCSs severity and/or mood, fatigue and sleep difficulties, and improve physical functioning, return to activity, health-related quality of life, and illness perceptions. While most participants endorsed post-concussion symptoms at post-treatment and at follow-up time points, responses to qualitative interviews and GAS demonstrated that goals were attained, suggesting that symptom reduction is not always achieved but other areas of function can improve (e.g. increases in activity, participation, and ability to manage symptoms). Findings underscore the potential benefit of coordinated treatments in reducing PPCSs burden and contributing to functional goal attainment. This pilot data will inform the trial design of a phase-II randomised controlled trial.

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05 Identification of At-Risk Patients that need more Intensive Treatment Following mTBI: Post-Hoc Inisghts

Myrthe Scheenen[1] , Harm Jan van der Horn[1] , Myrthe de Koning[2] , Joukje van der Naalt[1] , Jacoba Spikman[1]

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[2]MST Twente Medical Center

Objective: To identify at-risk patients unresponsive to preventative treatment following mild traumatic brain injury (mTBI), by retrospectively studying demographics and several psychological measures two weeks after injury on their predictive value with regard to return to work (RTW) and functional outcome twelve months post-injury.
Participants and Methods: The study is a post-hoc study of a RCT which was part of a larger prospective cohort-study on outcome following mTBI (UPFRONT-study). In this RCT, the effectiveness of an CBT intervention was compared to telephonic counseling in at-risk mTBI patients. In total, 84 patients were included and randomized. Of those 84 patients, 39 patients received five sessions of the CBT intervention and 45 patients received five sessions telephonic counseling (which included psycho-education). For this post-hoc analysis, we investigated the 84 patients as one at-risk group that received a form of psychological treatment (either CBT or telephonic counseling). A binomial logistic regression was performed to determine which variables at two weeks post-injury had the strongest contribution to the prediction of an unsuccessful RTW and an unfavorable outcome twelve months post-injury.
Results: Of the 84 patients, 43 (51.2%) showed a favorable functional outcome twelve months post-injury, and 56 (66.7%) of these patients had a full RTW twelve months post-injury. The patients with an unfavorable outcome and unsuccessful RTW had a higher age and higher levels of psychological complaints (i.e. higher reports of anxiety, depression, PTSD) at 2-weeks post-injury and 12 months post-injury. With regard to outcome (GOSE), the logistic regression model was statistically significant ($c^2(6)=28.08$, $p<.0001$). Of the 6 predictor variables, 3 where significant: levels of anxiety, depression and the treatment condition. With RTW, the logistic regression model was statistically significant ($c^2(6)=20.69$, $p<.001$), and 3 out of 6 predictor variables were significant: patients with higher levels of depression, posttraumatic stress and a higher use of a passive coping style at two-weeks had higher odds of an unsuccessful RTW.
Conclusions: This post-hoc study is one of the few studies that investigates the factors within an at-risk mTBI group that may predict patients being more or less likely to benefit from treatment. The main findings comprise several differences in demographic and psychological measures between the patients with a favorable outcome and an unfavorable outcome and between patients that have returned to work versus the patients that have not. Moreover, in both our prediction models of outcome and RTW, we found several psychological measures assessed at two weeks post-injury that greatly determined the likelihood of patients benefitting from the preventive treatment.
Our results seem to suggest that from the beginning there are some patients for whom a short preventive treatment is not sufficient, and that selection and treatment of at-risk patients might be better based on psychological symptoms instead of general posttraumatic complaints.

Paper Session 06: Everyday memory failures and confabulation

8:30- 9:50h
Thursday, July 7, 2022

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01 The Scottish Memory Aid Survey: What Memory Aids are Recommended for People With Dementia or MCI?

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Objective: Impairments in memory are common in those living with dementia and have significant impact on individuals' everyday functioning, quality of life and ability to live independently. Electronic prospective memory aids have been found to increase remembering in other clinical populations, though evidence on the use of such tools for people with dementia or Mild Cognitive Impairment is limited. This study examined what memory aids healthcare professionals working within Older People's Community Mental Health Services in Scotland recommend to people with Dementia or Mild Cognitive Impairment. It also looked at the barriers to using technological memory aids.
Participants and Methods: Participants (N=138) were healthcare professionals working within dementia services across Scotland. Each participant completed an online survey examining what memory aids they recommend to people with Mild Cognitive Impairment or Dementia and what they think the barriers are to using technological memory aids with this population.
Results: The healthcare professionals recommended non-technological memory aids/strategies more than technological tools. The most recommended strategies were leaving objects in the same place and using a whiteboard or wall chart, which over 80% of the participants often recommend to clients. The most frequently recommended assistive technology was alarm clocks. Mobile phones were also recommended, but only 20.3% of professionals said that mobile phones are often recommended. The majority of the healthcare professionals believed technology reminding tools can be effective for clients with dementia or Mild Cognitive Impairment and reported feeling confident in recommending such tools. However, most also believed that their clients would have difficulty in accessing and learning to use technology as a memory aid. As the length of time working in older people's services increased, the healthcare professionals were more likely to recommend technological reminding tools. Additionally, healthcare professionals who were more confident in using technology themselves were more likely to feel confident in recommending technology-based reminders to their clients.
Conclusion: This study highlights that healthcare professionals working with people with dementia or Mild Cognitive Impairment recommend non-technological memory aids and strategies to their clients more frequently than technological reminding tools. The main perceived barriers to the use of technological memory aids were that the professionals believed their clients would find it difficult to learn how to use new technology and that they prefer writing things down than using a technological tool. The potential benefit of training for healthcare professionals on how to actively promote the use of technological tools to improve the quality of life of people with dementia is also highlighted. Future research is required to understand the optimal design of technological reminding tools to ensure accessibility and effective use for this population.

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02 Cinderella Was Attacked by the Bad Wolf: Confabulations on Story Recall in Alcohol-Related Cognitive Disorders

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Objective: The relation between (spontaneous and provoked) confabulations and intrusions in patients with Korsakoff's syndrome (KS) and patients with alcohol-related cognitive impairments (ARCI) remains under debate. This study examines (1) differences in the production of confabulations and intrusions between patients with KS and ARCI, (2) whether an altered familiar story induces more intrusions in patients with KS and ARCI, and (3) whether different types of intrusions were significantly related to confabulations.

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Participants and Methods: Twenty-two patients with KS and twenty-three patients with ARCI recalled three different types of stories: a novel story, a familiar fairy tale, and a modified familiar fairy tale. Different types of intrusions were correlated with confabulation measures.
Results: Patients with KS produced more intrusions in the modified familiar fairy tale condition than patients with ARCI, but these were unrelated to confabulations. Only unrelated intrusions and pro-active interference were related to provoked confabulations.
Conclusions: The results of this study indicate that researchers and clinicians must be aware that *in general,* intrusions on memory tests should not be interpreted as confabulations. Especially spontaneous confabulations are different from intrusions on any type of story recall. When measuring confabulations it is crucial to use validated instruments, such as the NVCL-R, the Confabulation Screen or the Dalla Barba confabulation battery.

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03 Neural correlates of confabulation: what we have learned so far

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Objective: Confabulation is a particular symptom observable in some amnesic patients, unaware of their memory deficit, which consists of statements that are unintentionally incongruous to the patient's history, background, present and future situation. This pathological condition was first comprehensively described by Korsakoff in 1889, but it is observed in several diseases affecting the nervous systems and can follow lesions located in several brain areas. Given the complexity of this phenomenon a generally accepted theoretical account of its underlying neurocognitive mechanisms has yet to emerge. Some accounts emphasize the role of a frontal/executive dysfunction in confabulating patients, mainly related to the role of strategic retrieval and monitoring processes. On the other hand, some theoretical accounts have explained confabulation as the results of an impairment involving temporality. In this line, Dalla Barba (2002) proposed that confabulation is not a 'pure' memory disorder but rather a pathological condition that involves individual's personal temporality distortion. Accordingly, different studies have shown that confabulating patients often not only confabulate about their past, but also about the ongoing reality and when predicting their personal future (La Corte et al. 2010, 2011). However, given the heterogeneity of lesion site it seems difficult to identify a specific neural correlate of confabulation.

Participants and Methods: The main objective of the present study is to shed light on the neural correlates of confabulation as a function of their content.Within this aim we performed in a first time a systematic review of 44 studies published between 1993 and 2021, including 216 confabulating patients of different neurological etiology. Only studies using the Confabulation Battery (Dalla Barba, 1993) for the assessment of confabulation and with a description of anatomical lesions were included in the analysis. Furthermore, in a second time we realized a meta-analysis on individual neuropsychological and anatomical data, that were available for 25 studies including 57 patients.
Results: Our main findings show that: i) 62 % of confabulating patients had lesions over at least one region of frontal lobe and only 17 % showed lesions over temporal regions ii) confabulating patients without temporal lesions produced significantly more confabulation in temporal consciousness domain. In conclusion these results are in line with our hypothesis showing that despite the various anatomical lesions found in the confabulating patients, temporal regions are often relatively preserved.
Conclusion: We discuss our results within the framework of the memory consciousness and temporality theory (Dalla Barba, 2002) and the others cognitive models proposed in the literature to explain the cognitive mechanisms

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underlying confabulation in particular the frontal/executive account (Moscovich & Melo, 1997). Moreover, we discuss our neurocognitive model which state that the hippocampus is the neural correlate of temporal consciousness, which is lost in classical amnesia and present, but malfunctioning in confabulation (Dalla Barba & La Corte, 2013).

Symposium 02: Cognitive Rehabilitation and Neuroimaging in Clinical Populations

Chair: John DeLuca
Presenters: Alessandro Cicerale, Benjamin Hampstead, John DeLuca, Agurne Sampedro, Natalia Ojeda

10:00- 11:20h
Thursday, July 7, 2022

SYMPOSIUM SUMMARY:

Cognitive Rehabilitation and Neuroimaging in Clinical Populations

John DeLuca[1]

[1]New Jersey Medical School

Evidence for cognitive rehabilitation has been accumulating for the past several decades across various clinical populations. More recently this evidence has started to include changes in the brain which have been shown to be associated with rehabilitation effectiveness. This symposium will summarize the behavioral and neuroimaging data associated with cognitive rehabilitation in four clinical populations: Traumatic Brain Injury, Schizophrenia, Multiple Sclerosis, and Aging and Dementia. Presentations will be given by leading researchers/clinicians from each respective field. Speakers will present current research findings, discuss the limitations of this work and discuss future research needs regarding behavioral and neuroimaging aspects of cognitive rehabilitation in each of their respective areas of expertise. The four presentations will be followed by a discussion on how such work impacts on clinical applicability currently and in the future.

01 Cognitive Rehabilitation and Neuroimaging in Schizophrenia

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Cognitive impairment is a major feature of schizophrenia that appears to be caused by multiple structural and functional brain alterations. Despite advances in antipsychotic treatment, this is not effective in improving cognition and functional outcome in this disease. Therefore, non-pharmacological interventions, such as cognitive rehabilitation, have gained importance in the recent decades. Cognitive rehabilitation has been shown to be effective not only in improving cognition, clinical symptoms and functional outcome, but also in inducing brain structural and functional changes in people with this pathology. However, results across studies are still inconclusive and heterogeneous. Moreover, little is known about the brain changes when using an integrative cognitive rehabilitation combining different types of trainings (e.g., social cognitive training, and functional and social skill training). This presentation will summarize the main current findings on behavioral and neuroimaging changes induced by cognitive rehabilitation in schizophrenia. In addition, it will present the results of a current study analyzing the functional (task-based and resting-state fMRI) and structural (T1-weighted and diffusion-weighted images) brain changes produced by an integrative cognitive rehabilitation program (the REHACOP program) in patients with schizophrenia.

Paper Session 07: Infectious disorders and Neuropsychology: Covid and HIV

10:00- 11:20h
Thursday, July 7, 2022

01 Neuropsychological Outcomes Among Children Living With HIV Presenting With New-Onset Seizures In Zambia

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Objective: Neurodevelopmental deficits have been identified in children living with HIV (CLWHIV) and children with seizures. However, there is limited research on the neurodevelopmental outcomes among HIV-infected children presenting with new-onset seizures. This study aimed to describe neurodevelopmental impairments among children with HIV presenting with new-onset seizures in Zambia.
Participants and Methods: The sample included a total of 47 children living with HIV presenting with new-onset seizures Median = 6 (IQR 3-16). Thirty participants were drawn from the urban site, while 17 were from non-urban areas. 23(48.9%) were male. Only 3% were virally suppressed, 53% had WHO stage 4, and 39% were on treatment. This study was completed as part of the Cohort of HIV-Associated Seizure and Epilepsy (CHASE) Study. CLWHIV presenting with new-onset seizures were prospectively identified at Zambia's University Teaching Hospitals (UTH) in the capital city, Lusaka, and two rural, regional hospitals. Relevant HIV treatment history, epilepsy family history, and seizure severity were collected from the participants. Children between 3 months and five years of age were assessed using the Malawi Developmental Assessment Tool (MDAT), while Children aged 5 -17 were evaluated using the Universal Non-Verbal Intelligence Test Version 2 (UNIT-2). Of the 47 children who underwent neuropsychological assessments, 26 were assessed with the MDAT, and 21 were evaluated with the UNIT. Descriptive statistics were used to establish associations between neuropsychological outcomes, HIV treatment history, and seizure severity.
Results: HIV disease severity was associated with impairment on both the MDAT and the UNIT. Ten percent of the children were classified as severely impaired based on the MDAT, while 13 percent were classified as impaired based on the UNIT. 80% of participants with WHO stage 4 were classified as impaired on the MDAT. Similarly, 50% of participants with WHO stage 4 were impaired on the UNIT. Particular impairments were seen in the gross motor and fine motor domains of the MDAT. Further, seizure severity and having multiple seizures were also associated with poorer neurocognitive scores on the UNIT.
Conclusion: The study showed that HIV disease severity was associated with poorer neurodevelopmental outcomes. Further, having severe and multiple seizures was equally associated with poorer neurodevelopmental outcomes. The findings indicate that poor neurodevelopmental outcomes are still present among CLWHIV in an era with widespread ART availability. Poorer neurodevelopmental outcomes may negatively impact other aspects of life, such as academic achievement, which have been cited for playing a significant role in different life factors, such as adherence to medication, transitioning to adult clinics, and securing employment. Therefore, routine neuropsychological assessments may help identify possible interventions that would help improve wellbeing among CLWHIV presenting with seizures.

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02 The Role of Neuropsychology in HIV Cure

Jose A. Muñoz-Moreno[1]

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Objective: In the recent years, some people have achieved the cure of HIV infection. Others are under a functional cure, a fact that is closely monitored to confirm a potential complete remission in a future. This scenario has opened the chance to cure more people living with HIV, although consolidated therapeutically effective strategies are not available yet. Global international research developed in this field should consider neuropsychological outcomes as a requirement, for some crucial reasons. This presentation will highlight relevant aspects of research on HIV cure and their connections with cognitive functioning and neuropsychology.
Participants and Methods: An oral exposition is proposed to address key features related to research on HIV cure and neuropsychology. The presentation will be separated into 3 blocks: 1) overview of available HIV cure strategies, 2) relevant neuropsychological aspects related to HIV eradication, and 3) useful recommendations to follow a practical neuropsychological approach in the HIV cure research agenda. All information provided will be based on previous scientific evidence, in combination with expert opinion.
Results: Strategies for HIV eradication include, mainly: 1) bone marrow transplant, with the

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primary objective of creating an HIV-resistant immune system; 2) *kick&kill* strategies, to flush out latent HIV; 3) genome editing, to disrupt latent HIV proviruses; and 4) *block&lock* strategies, to lock-in latent HIV genomes and prevent expression. Any of those approaches may have implications for central nervous system and neurocognitive status, as a result. If a new therapeutic scheme or compound is proposed to be tested, neurocognitive safety should be always considered. This is even more important, since HIV-associated neurocognitive disorders prevalence has been highly described in people living with HIV (i.e., 30-60%), and because numerous risk factors for HIV-associated neurocognitive impairment have been reported (e.g., educational level, drug use, cardiovascular risk factors, type of antiretroviral regimen, low therapeutic adherence). Additionally, HIV eradication interventions regularly require the cessation of combination antiretroviral therapy. That fact could lead to an increase of viral reservoir in the brain, with expected negative contributions for neurocognitive status. Complementarily, some of the compounds proposed for HIV eradication could incidentally induce benefits for brain protection (e.g., histone deacetylase inhibitors). In fact, consistently promising evidence is growing in this direction in the recent times. Nevertheless, despite all those reasons, to date only 3 human clinical trials with HIV eradication aims have been published considering neuropsychological outcomes in their study endpoints.
Conclusions: Different strategies for HIV cure have been proposed, with different therapeutic schemes, objectives, and health implications. Central nervous system sphere and neurocognitive outcomes should be importantly considered in this setting for manifested reasons. However, at the present, only a residual number of studies testing new HIV cure strategies have considered neuropsychological outcomes in their objectives and assessments.

04 Post COVID-19 Fatigue: the Role of Cognition and Neuropsychiatric disorders

Marco Calabria[1] , Carmen García-Sánchez[2] , Nicholas Grunden[3,4] , Catalina Pons[5] , Juan Antonio Arroyo[2] , Beatriz Gómez-Anson[2] , María del Carmen Estévez García[2] , Roberto Belvís[2] , Noemí Morollón[2] , Javier Vera Igual[2] , Isabel Mur[2] , Virginia Pomar[2] , Pere Domingo[2]

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Objective: According to the definition of the World Health Organization, fatigue is a common symptom of the post COVID-19 condition that is frequently accompanied by cognitive dysfunction and neuropsychiatric symptoms. However, less is known about the relationships between these components of post COVID-19 condition and fatigue itself. Consequently, the present study aimed to (1) distinguish the types of fatigue experienced by participants and (2) investigate whether cognitive deficits across various domains and neuropsychiatric conditions predicted these different types of fatigue.
Participants and Methods: The study included a sample of 136 consecutive patients with subjective cognitive complaints after SARS-CoV-2 infection from the Hospital de la Santa Creu i Sant Pau in Barcelona (Spain). The sample was composed of 49 males (36%) and 87 females (64%), with a mean age of 51.7 years (SD= 13.5; range: 20-88) and mean level of education of 13.6 years (SD= 3.2).

We used: a) the Modified Fatigue Impact Scale (MFIS) to evaluate fatigue in patients, b) the Hospital Anxiety and Depression Scale (HADS) to assess depression and anxiety symptoms, c) Frontal Systems Behavior Scale (FrSBe) to assess frontal and apathy symptoms, and d) the EQ-5D and WHOQOL-BREF scales for assessing the quality of life and impact on daily functioning. Cognitive status was evaluated with a comprehensive neuropsychological assessment spanning a wide range of cognitive domains, including general cognitive status, attention, short- and long-term memory, language, processing speed, visuoperceptual-visuoconstructive functions, and executive functions
Results: 112 patients (82.3%) showed clinically significant levels of fatigue according to their MFIS scores with worse quality of life and poor daily functioning. Based on HADS scores, thirty-two patients (23.5%) showed clinically significant levels of depressive symptoms, while 48 (35.3%) patients showed significant levels of

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anxiety. Based on FrSBe scores, the number of patients with scores meeting the cutoff for significant front systems dysfunction increased from 27 (19.9%) before Covid to 93 (68.4%) at the time of assessment ($\chi 2(1)= 51.06$, $p< .001$). The most frequent cognitive deficits were for: learning and long-term memory (32.3%), sustained attention (36.8%), and executive function (28%).
Regression analyses showed that the total score on the MFIS was predicted by depression, anxiety, apathy, anxiety, backward digits, and sustained attention scores (50.2% of variance). However, the cognitive subscale score of the MFIS was predicted by depression, anxiety, executive dysfunction (FrSBe), and backward digit scores (41.8% of the variance). Finally, the physical subscale score of the MFIS was predicted by apathy (FrSBe), anxiety, TMT-B scores, and sex (40.2% of the variance).
Conclusions: First, fatigue was very prevalent in our sample, as 82.3% of individuals reported clinically significant levels of fatigue on the MFIS. Second, we found that the different components of fatigue were predicted by different factors, being apathy the most common neuropsychiatric symptom and executive dysfunction the most common for cognition. Finally, several other clinical variables associated with the severity of infection were not significant predictors of the magnitude of fatigue suffered by COVID-19 survivors.

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05 Cognitive Performance and Psychological Distress after ICU Discharge in Patients with Critical COVID-19

Roy P.C. Kessels[1] , Harmke B. Duindam[2] , Bram van den Borst[3] , Peter Pickkers[2] , Wilson F. Abdo[2]

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[3]Radboud University Medical Center, Department of Pulmonary Diseases, Nijmegen, The Netherlands

Objective: There is increasing concern about adverse effects of COVID-19 on the brain. Of special concern is the possible occurrence of long-term cognitive dysfunction and mental health impairments, which negatively impact patients' rehabilitation and outcome. Neuroinflammation might serve as an important driving mechanism, which can lead to disruption of the blood-brain barrier, resulting in increased levels of cytokines within the brain, microglia activation and additional axonal damage. Different treatment regimens with inflammation-modifying drugs have been used to counteract the systemic inflammation, which may ameliorate the cognitive impairment. Aim of this prospective cohort study was to assess long-term cognitive function and mental wellbeing in COVID-19 ICU survivors and to explore whether three different SARS-CoV-2 immunosuppressive therapies were associated with (neuropsychological) outcomes.
Participants and Methods: 3 groups of patients who were admitted to the ICU with critical COVID-19 between March 2020 and June 2021 were included in this study (total N=96). Group 1 (no immune-modulating therapy) consisted of 28 patients. Group 2 (received only dexamethasone) consisted of 26 patients and group 3 (received both dexamethasone and tocilizumab, an interleukin-6 [IL-6] receptor antagonist) consisted of 42 patients. General information and COVID-19 specific data and relevant endpoints were collected from medical records. Neuropsychological assessment took place on average 6.5 months (SD=1.3) after discharge from the ICU. The test battery consisted of the Montreal Cognitive Assessment, Trail Making Test, Letter-Digit Substitution Test and the Digit Span. In addition, subjective cognitive complaints were measured with the Cognitive Failure Questionnaire and psychological symptoms with the Hospital Anxiety and Depression Scale and Brief Symptom Inventory. Test results were converted into age- and education adjusted standard scores using the Dutch ANDI normative data, and patients were classified as being cognitively impaired using clinical cut-offs.
Results: 24 participants (25%) were classified as cognitively impaired based on their overall test results. Patients with cognitive impairment had a lower education level and more often had diabetes mellitus. C-reactive protein at admission was significantly lower in patients with cognitive impairment. There were no differences between the treatment groups on any of the cognitive tests, anxiety, depressive symptoms, and overall psychopathological symptoms. The patients with subjective cognitive complaints post-ICU admission had a shorter time on ventilator and a shorter ICU stay. This group also showed more delirium- and coma-free days than those with cognitive complaints, even though the total proportion of delirious or comatose patients was the same. Regarding the other questionnaires, the

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subjectively cognitively affected group reported more anxiety, depressive symptoms and other psychopathological symptoms. The level of subjective cognitive complaints did not correlate with the patients' objective cognitive performance.
Conclusions: In this observational study on long-term cognitive impairment in a unique sample of survivors of critical COVID-19, 25% showed cognitive impairment 6 months after ICU discharge. This rate is similar to findings in non-COVID ICU cohorts of patients with acute respiratory distress syndromes. These objective impairments were neither related to subjective cognitive complaints nor to psychological distress. Our study did not find any association between anti-inflammatory medication and long-term cognitive performance.

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06 Associations of Subjective and Objective Cognitive Outcome of COVID-19 in a Finnish Cohort

Riikka Pihlaja[1,3] , Henriikka Ollila[2] , Annamari Tuulio-Henriksson[1] , Sanna Koskinen[1] , Marjaana Tiainen[4] , Viljami Salmela[1] , Johanna Hästbacka[2] , Laura Hokkanen[1]

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Objective: COVID-19 patients have commonly reported subjective cognitive complaints but there are contradictory results on how self-reported cognitive issues reflect objective cognitive evaluation. We aimed to examine subjective and objective cognitive impairment and their associations with patient-reported outcomes after COVID-19 in three groups of patients: ICU-treated, ward-treated, and home-isolated. This research is part of the RECOVID-20 study (ClinicalTrials.gov Identifier NCT04864938). The work by INS NeuroCOVID-19 SIG provided important methodology and literature to guide the planning of our study.

Participants and Methods: We assessed 184 COVID-19 patients (56% female, median age 56 (IQR 46-63)) who were treated at ICU (ICU; n=82) or other hospital wards (WARD; n=53) or isolated at home (HOME; n=49). A control group (n= 53, 49,1% female, median age 56 (IQR 49-63.5)) with no history of COVID-19 was included. The patients were assessed at 3 and 6 months and the controls once. Subjective cognitive impairment was assessed with the A-B Neuropsychological Assessment Schedule (ABNAS) and objective cognitive dysfunction screened with Montreal Cognitive Assessment (MoCA). Post-traumatic stress was evaluated with the Impact of Event Scale-6 (IES-6). The patients evaluated their health before COVID-19 and three months after the infection with Patient-Reported Outcomes Measurement Information System (PROMIS). Using cut-offs, participants were grouped to high or low scores in ABNAS and impairment or no impairment in MoCA.
Results: High levels of subjective cognitive impairment were reported by 37.8% of ICU, 41.3% of WARD, and 45.7% of HOME patients at three months and 32.3%, 37.3%, and 33.3% at six months after COVID-19, compared to 4% of controls. There were no statistically significant differences between ICU, WARD, and HOME groups in ABNAS median scores at three ($p=.845$) or six months ($p=.616$) and no statistically significant changes in ABNAS scores from 3 to 6 months. Objective cognitive impairment was present in 53.2% of ICU, 61.4% of WARD, and 30% of HOME patients at 3 months, and 36.1%, 34.7%, and 8.9% at six months, respectively. ICU ($p=.001$) and WARD ($p=.012$) patients had higher IES-6 scores at six months than controls but the HOME group did not ($p=.066$) differ from controls. ABNAS correlated with IES-6 at 3 ($r=.600$, $p< .001$) and 6 months ($r=.581$, $p< 001$). ABNAS correlated with PROMIS global health score at 3 and 6 months. ABNAS correlated with MoCA at 3 months ($r=.191$, $p=.024$) but not at 6 months ($r=.014$, $p=.868$). After adjusting for age, education, and IES, the correlation between ABNAS and MoCA at 3 months did not remain significant ($r=-.082$, $p=.389$).
Conclusions: Subjective cognitive impairment was reported by over one-third of COVID-19 patients in a six-month follow-up, regardless of hospitalization status. Objective cognitive dysfunction was most evident in ICU- and WARD-groups, but decreased in follow-up. Subjective symptoms correlated with post-traumatic stress and health perceptions, and with objective cognitive evaluation at three months, but this association did not remain significant after controlling for age, education, and IES.

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Given the relationship between psychological symptoms and patient-reported cognitive impairment, it is important to thoroughly assess cognition among patients reporting long-term subjective symptoms.

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07 Is brain fog the same in Post-COVID-19 condition and Myalgic Encephalomyelitis/Chronic Fatigue Syndrome?

Naiara Azcue González[1] , Juan Carlos Gomez Esteban[1,2,3] , Marian Acera [1] , Beatriz Tijero [1,2] , Tamara Fernandez [1,2] , Naia Ayo Mentxakatorre[1] , Tomas Perez-Concha[2] , Ane Murueta-Goyena[1,3] , Jose Vicente Lafuente[3] , Alvaro Prada[4,9] , Adolfo Lopez de Munain[5,6] , Guillermo Ruiz Irastorza[7] , Laureano Ribacoba[7] , Iñigo Gabilondo[1,2,8] , Rocio Del Pino[1]

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Objective: Given the similarity between Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) and the post-COVID-19 condition, this study aims to analyze the profile of symptoms of both pathologies, describe the cognitive impairment and neuropsychiatric symptoms, to find out whether both represent the same pathology with a different precipitating factor.
Participants and Methods: The sample included 27 patients with ME/CFS and 35 patients with post-COVID-19 condition recruited through the Neurology Department at the Cruces University Hospital. A neuropsychological battery was administered to evaluate a wide range of cognitive domains. In addition, fatigue, sleep quality, anxiety, and depressive symptoms, and the frequency and severity of different symptoms were evaluated. A descriptive analysis was performed using frequencies and standardized scores of the cognitive tests. A comparison of means was made with the Student's t and Mann-Whitney U tests. The relationship between neuropsychological variables and cognitive domains were analyzed with Pearson's bivariate correlation coefficient or Spearman's Rho coefficient. Finally, a stepwise linear regression was performed to analyze the association of neuropsychiatric symptoms with cognitive variables.
Results: Both syndromes were characterized by excessive physical fatigue, sleep problems, myalgia, and muscle heaviness. Fatigue and the feeling of heaviness when starting an exercise were the most prevalent symptoms in both pathologies. Frequency and severity of symptoms were greater in the ME/CFS group. Sustained attention and processing speed were impaired in 74.1% and 70.4% of ME/CFS while in post-COVID-19 condition were impaired in 60% and 48.6% of patients, respectively. In cognitive tasks, only significant differences were found in abstraction, being the ME/CFS group the one with the worst performance. Sleep quality and fatigue were the most strongly associated factors with the cognitive performance, fatigue explaining up to 41.6% of the variance of sustained attention in post-COVID-19 patients.
Conclusions: The symptomatology and cognitive impairment are similar in both groups, suggesting that they might be the same pathology. Both pathologies showed slow processing speed, deficient sustained attention and verbal memory impairment. High physical fatigue, discomfort after mild activities, non-restorative sleep, myalgia and muscle weakness were the most common non-cognitive symptoms in both pathologies, along with cognitive problems, including lack of concentration, mental fatigue and forgetfulness. The difference in disease duration between groups could explain the worse perception of symptoms by ME/CFS patients, as well as the slightly worse performance in the tests.

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Paper Session 08: Executive functions and control-inhibition

10:00- 11:20h
Thursday, July 7, 2022

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01 The Role of the Frontal Aslant Tract in Executive Functions: a Quantitative Tractography Study

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Objective: Focal white matter lesions can cause cognitive impairments due to disconnections between or within networks. Preliminary evidence suggests that there are specific hubs and fiber pathways that should be spared during brain tumor surgery to retain cognitive performance. A tract potentially involved in important executive cognitive processes is the frontal aslant tract. It connects the posterior parts of the inferior frontal gyrus with the superior frontal gyrus. Functionally, the left frontal aslant tract has been associated with verbal fluency and speech initiation. Much less is known about the functionality of the right frontal aslant tract. Studies that examined the areas connected by this right-sided tract suggest an involvement in executive functions. However, there is currently insufficient knowledge about the exact functional importance of the right frontal aslant tract. The aim of this study was to investigate the role of the right frontal aslant tract in executive functions via a lesion-symptom approach.
Participants and Methods: Seventy-two patients with frontal glial tumors were retrospectively analyzed and both distance between tract and tumor and structural integrity (fractional anisotropy and mean diffusivity) of the tract were correlated with cognitive test performances and tested in a multivariable regression model.
Results: The results indicated that close proximity of a tumor to the right frontal aslant tract was related to poorer cognitive performance, in particular on tests of phonemic fluency and shifting attention. Disturbed microstructural integrity of the frontal aslant tract was also related to impaired performance on these cognitive tests. This involvement was not found for the left tract.
Conclusions: The results suggest that the right frontal aslant tract is involved in executive functions. A better understanding of the functional frontal subcortical anatomy may have important implications for neurosurgical practice. In brain tumor surgery, an optimal balance has to be found for each patient between maximal tumor removal, to optimize oncological outcome, and minimal damage to structures that are critical for normal daily functioning. In awake brain tumor surgery, the function of structures can be monitored with specific tasks that are performed by the patient. We feel that clinical introduction of new tasks for this purpose should follow a scientific plan and be hypothesis driven. The results from this tractography study provided us with arguments and hypotheses to test the frontal aslant tract in a patient with a right frontal low-grade glioma that partly infiltrated the frontal aslant tract. During awake surgery, direct electrical stimulation of the frontal aslant tract disrupted inhibitory and working memory functions. To conclude, we provided converging evidence that the right frontal aslant tract is important for executive functions. Further research should assess whether or not damage to the right frontal aslant tract causes permanent deficits in executive functions, and consequently identifies this tract as a critical pathway that should be spared during neurosurgical procedures.

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02 Remote tele-assessment of executive functions: Adapting the Jansari assessment of Executive Functions, JEF©

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Objective: The global pandemic meant that most in-person testing was halted and the transition to remote neuropsychological testing

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proved a challenge most significantly with the assessment of executive functions (EFs), where standard tests do not adapt well to an online platform. To address these needs, the Jansari assessment of Executive Functions (JEF©, Jansari et al, 2014) a virtual reality ecologically-valid assessment and its equivalent for children, JEF-C© were adapted for remote testing using the video-conferencing platform Zoom.
Participants and Methods: JEF© resembles a computer game in which, for the adult version, the participant has to play the role of an office assistant performing simple administrative tasks, and for the children's version, the child is in charge of running their own birthday party while their parents are away. The task is run on a Windows laptop and administration takes about 45 minutes. Performance is evaluated on eight EF constructs: Planning, Prioritisation, Selective-Thinking, Creative-Thinking, Adaptive-Thinking, Action-Based Prospective Memory (PM), Event-Based PM and Time-Based PM. The participant navigates through the virtual environment and also completes some 'real-world' paper-based tasks simultaneously. The entire protocol was adapted to allow the assessor to share their JEF© screen on Zoom with the participant who had to verbally navigate through the environment to perform the necessary tasks. Study 1 used JEF© to explore individuals with eating disorders (N=17) and Study 2 used JEF-C© to explore Looked After Children (LAC: N=26) since both groups are thought to have compromised EFs. To assess the integrity of the new remote-testing protocol, for each study, two assessors independently scored 10 of the participants.
Results: For JEF©, the inter-rater reliability for the eight constructs was between 0.94 and 1.00 while for JEF-C©, the inter-rater reliability was between 0.86 and 1.00. In terms of construct validity, the remote version of JEF© was able to reliably differentiate participants with self-reported eating disorders from matched controls ($F(8, 24) = 4.457$, $p = .002$; Wilks' $\Lambda = .402$; partial $\eta^2 = .598$) and power to detect the effect was high (.975). Similarly, the remote version of JEF found a significant difference between LAC and age-matched control children ($t(50) = 4.11$, $p < .001$, $d = 1.14$).
Conclusions: The results demonstrate that a complex virtual-reality based task can be adapted to be used remotely. The strong inter-rater reliability and group differences demonstrate that the new protocols have good psychometric properties. These findings ensure that both clinicians and researchers can reliably assess executive functioning in individuals who they are not able to meet physically using a version of a task that has previously been shown to have a high level of sensitivity. This offers increased clinical accessibility for patient groups living remotely from neuropsychology services and/or with limited access to transport, and for reducing costs associated with travel for medicolegal casework. For the researcher, this increases access to wider participant pools thereby improving generalisability of findings.

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03 Emotional Intelligence and Inhibitory Control in University Students

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Objective: Traditionally, cognition and emotion have been considered totally independent terms. However, more recently results have been found that suggest that Emotional Intelligence (EI), understood as the ability to perceive, understand, and regulate emotions in oneself and others, could be interactively and bidirectionally related to Executive Functions, more specifically with Inhibitory Control. However, to date in previous studies that have explored this relationship, different results have been found depending on both how EI is conceptualized and measured, and the type of tasks and stimuli used to study Inhibitory Control. Objective: To explore the possible relationship between EI (understood as ability and with measures of execution and self-report) and Inhibitory Control of interference suppression through a task with neutral stimuli in university students.
Participants and Methods: 112 participants (57 men and 55 women) participated. To obtain emotional intelligence measures, the following were used: the Spanish version of the Wong and Law Emotional Intelligence Scale (WLEIS-S) as self-report measures and the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) as performance measure. To obtain Inhibitory Control measures, the Attention Network Test (ANT) was used, using the interference effect as an indirect measure of the inhibitory control capacity of the participants, which is obtained by comparing the reaction times and the percentage of errors in congruent and incongruent trials.
Results: On the one hand, a negative and significant correlation $r=-.2$, $p=<.05$ was shown

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between the total score of EI in the execution test (MSCEIT) and the response time in the flanking task. On the other hand, a negative and significant correlation was shown between the total score of the level of perceived EI in the self-report test (WLEIS-S) and the reaction time in the incongruent trials *r*=-.18, *p*=<. 05 and in the interference effect *r*=-.19, *p*=<.05 of the ANT task. Subsequently, in complementary analyses it was observed that those participants with a high perceived EI (participants who obtained a score above the 75th percentile on the WLEIS-S scale) obtained a significantly lower interference effect on the ANT than the participants with low EI (participants who scored below the 25th percentile; *U*=276; *p*.=.02).
Conclusions: These results suggest that the participants' self-perception of their ability in EI seems to be a better predictor of efficiency in cognitive tasks of suppression of interference with neutral stimuli, rather than performance in tasks of execution of EI. The importance of these results is highlighted, since a better understanding of this relationship could contribute to the promotion of people's psychological well-being.

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04 Direct and indirect measures of executive functions in middle childhood

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Objective: Updating of working memory is one of the core components of executive functions (EFs) that involves the ability to maintain and manipulate information in memory. The correct development of this ability turns out to be crucial in basic processes that children face during the formal schooling period, such as reading comprehension and solving mathematical problems. However, there are few studies that have analyzed the developmental trajectory of this component during middle childhood. Therefore, the possible changes that occur in this executive component during this stage of development lead to the need to examine the dimensionality of the EFs construct. To date, little research has been found on the correspondence between performance-based evaluation (direct measure) and self-report measures (indirect measure) of EFs. Therefore, in this study we have two objectives: (1) to analyze the trajectory of development of the updating ability between 6 and 11 years of age. And, (2) investigate to what extent the direct and indirect measures of executive functioning are reporting the same aspects of the EFs.
Participants and Methods: A total of 139 children between 6 and 11 years old (M=8.64; SD=1.54) with typical development participated. As a direct measure of executive functioning, a computerized updating task based on the 2-back paradigm was used. While the indirect measure was obtained through the parent version of the Behavioral Assessment of Executive Function Questionnaire (BRIEF-2).
Results: The results regarding the first objective showed that updating of working memory ability significantly improves between 6 and 9 years. In addition, analyzes regarding the relationship between direct and indirect measures of executive functioning indicated a significant, but low correlation between updating and some regulation indices, as well as with the global executive functioning index.
Conclusions: Therefore, we can conclude that from the age of 9, children have developed their updating of working memory ability. However, and in agreement with previous studies, even though this representative ability of executive functioning seems to be more stable, the results of this study show that the direct measurement of EFs is only weakly related to some indices provided by the indirect measurement in the BRIEF-2. Therefore, these results support the hypothesis that these two measures of EFs (direct and indirect) report different aspects of executive functioning in children. Consequently, these results must be considered due to the clinical and educational implications.

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05 Impulsiveness Profile in a Chronic Eating Disorders Sample: Upps-P and Stroop Inhibition/Switching task

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Objective: Eating Disorders (ED) are present in several psychopathological disorders and may have serious long-term consequences. These complications may be related to impulsive or extremely rigid behaviors that arise from executive dysfunction. Therefore, Eating Disorders may be related to a cognitive style characterized by inflexibility and excessive attention to detail or, on the contrary, an impulsive and unreflective analysis. We aimed to examine the impulsivity profile in a sample of adults with eating disorders and compared it with patients with an eating disorder with comorbid psychopathological diagnostics such as borderline personality disorder (BPD) and obsessive-compulsive disorder (OCD).
Participants and Methods: Seventy adult patients (65 women; mean ± SD age, 26.54±7.5 years) from an Eating Disorders Unit (ITA Especialistas en Salud Mental) in two treatment regimens; hospitalization (n=55) and Day Hospital (n=15) participated in the study. Patients were divided into three groups according to their primary diagnosis: ED (n=39), ED comorbid with BPD (n=20) and ED comorbid with OCD (n=11). The Eating Disorders Inventory III (EDI-III) was used to characterize the profile and severity of the eating disorder, the Impulsive Behavior Scale (UPPS-P) was used to assess the impulsivity profile, cognitive flexibility and inhibition/switching was evaluated with the Stroop Test and the Delis-Kaplan Executive Function System (D-KEFS) using direct scores. One-way ANOVA with *post hoc* tests were performed to test for differences between the three sub-groups. Statistical significance was set at $p<0.05$.
Results: For the EDI-III subscales, participants in the BPD group showed significantly higher scores relative to the ED group in Personal Alienation (P = .001), Interpersonal Insecurity ($P = .012$), Emotional Dysregulation ($P < .001$), Ineffectiveness Composite ($P = .005$), Affective Problems Composite ($P = .009$), and Global Psychological Maladjustment Composite ($P = .008$). The BPD group also showed significantly higher scores compared to the OCD group in Emotional Dysregulation ($P = .002$) and Affective Problems Composite ($P = .007$). In the UPPS-P scale, Positive Urgency was significantly higher in BPD patients compared with the ED group ($P = .017$), and Negative urgency ($P = .018$), positive urgency ($P = .039$) and global Impulsivity score ($P = .029$) were significantly higher in the OCD group relative to the BPD group. The ED group showed differences in Sensation Seeking ($P = .045$) and Global Impulsivity scale ($P = .024$) compared to the OCD. The OCD group had a better performance on Inhibition-shifting measure (D-KEFS - Inhibition/switching task) compared to the BDP group ($P = .016$). Also, OCD group had significant differences in Bulimia scores compared to the BPD group ($p = .018$).
Conclusions: Our results support the idea that some Impulsive traits might be related to affective symptoms in patients with ED and those traits are more impaired in the presence of a prior history of BPD. Inhibition and Switching abilities seem to be related with cognitive stiffness related with the obsessive functioning. The clinical and treatment implications of our findings should be explored in future studies with larger samples.

Paper Session 09: Contributions of neurophysiological procedures to neuropsychological disorders

10:00- 11:20h
Thursday, July 7, 2022

01 Electrophysiological Disruptions and Cerebrospinal Fluid Biomarkers in Mild Cognitive Impairment Patients

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Objective: Alzheimer's Disease (AD) is a progressive neurodegenerative disorder characterized, at the neuropathological level, by

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the accumulation of amyloid-β (Aβ) neuritic plaques and neurofibrillary tangles formed by hyperphosphorylated tau protein. The so-called ATN (amyloid, tau, and neurodegeneration) model is nowadays the gold standard for AD. However, the biomarkers for these parameters must be derived from costly brain imaging techniques or highly invasive cerebrospinal fluid (CSF) analyses. On the other hand, electrophysiological signatures, as analyzed by the electroencephalography (EEG) technique, seem to be a non-invasive useful approach for evaluating the progressive loss of efficiency of neuronal networks throughout the AD continuum. However, it lacks validation against this model and therefore is far from clinical acceptance. Therefore, the purpose of this study was to explore the correlation between power EEG values derived from clusters of sensors and CSF markers in a sample of mild cognitive impairment (MCI) patients.
Participants and Methods: 27 MCI participants (aged from 61 to 85) were recruited from the Cognitive Disorders Unit of the Hospital Universitari Santa Maria (Lleida, Spain). All of them underwent a neuropsychological evaluation, CSF lumbar puncture and EEG recording. The cognitive evaluation included several test in order to assess different domains such as verbal memory, attention and executive functions, language and praxis.
Results: Amyloid. Male population showed a significant negative correlation (rho = -0.754, $p < 0.003$) between amyloid load and theta power in antero-posterior regions of the brain. The average power of the cluster correlated significatively with ADAS-Cog (rho = 0.562, $p < 0.037$), total tau (rho = 0.538, $p < 0.049$) and memory delayed recall (rho = -0.612, $p < 0.020$). Total tau. A widespread alpha power cluster was found in the male population whose oscillatory activity correlated negatively with t-tau CSF load (rho = -0.653, $p < 0.014$). When assessing the female population, we found a relationship (rho = -0.864, $p < 0.001$) between total-tau and beta power in a widespread cluster. Additionally, the beta cluster average power significatively correlated with p-tau load (rho = -0.800, $p < 0.005$) and age (rho = -0.621, $p < 0.041$).
Conclusion: Electrophysiological activity seems to be depicting a clear sex-based pattern of associations with neuropathological markers of AD. The men subsample showed a dual pattern consistent with a negative correlation with amyloid load in CSF (a positive correlation between theta power and higher Aβ levels in the brain), and a negative relationship between the alpha band and t-tau. On the other hand, the female subsample showed a negative correlation between the beta band and t-tau.

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02 Reward-processing in mTLE-UHS pre- and post-surgery: behavioral and neurophysiological correlates

Adrià Vilà-Balló[1,2] , Myriam De la Cruz-Puebla[1,3,4] , Diana López-Barroso[7] , Júlia Miró[1,4] , Jacint Sala-Padró[1,6] , David Cucurell[1] , Mercè Falip[6] , Antoni Rodríguez-Fornells[1,7,8]

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Objective: This study aimed to evaluate decision-making under ambiguity, using electrophysiological correlates (ERPs, theta, delta, and beta oscillatory activity) associated with reward processing in a sample of patients with medial temporal lobe epilepsy due to unilateral hippocampal sclerosis (mTLE-UHS), compared to healthy controls. Additionally, we aimed to assess the impact of mesial temporal lobe surgical resection in the patient group in these measures.
Participants and Methods: 17 mTLE-UHS patients were matched with 17 healthy control participants in age (patients: 40.8 ± 12.8; Controls: 40.5 ± 15.4; t (32) = 0.048, P = 0.962), gender (patients: 10F, 7M; Controls: 9F/8M; X^2 (1, N = 34) = .119, p = .730) and years of education (patients: 11.7 ± 4.2; Controls: 11.2 ± 4.6; t (32) = -0.273, P = 0.787). Participants conducted a computerized version of the Game of Dice Task (GDT), Standard

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Iowa Gambling Task (IGT), and a modified ERP version of the Gambling Task, during which we recorded 32-channel EEG. We computed the proportion of disadvantageous choices, the frequency of advantageous choices minus the frequency of disadvantageous choices, and the choice's risk pattern for the GDT, IGT, and ERP gambling task respectively. We calculated the mean amplitude for the Feedback-Related Negativity (FRN, 260-310ms). We performed time-resolved spectral power and we selected the mean activity for the delta (3-4Hz, 250-350ms), theta (4-5Hz and 300-400ms), and beta (27-32 Hz and 330-430ms) ranges.
Results: We observed a riskier pattern for the mTLE-UHS group in decision-making under ambiguity during the IGT (main effect of Group: $F(1,30) = 4.247$, $p = .048$), but not during the ERP gambling task (main effect of group: $F(1,32) = .268$, $p = .608$), compared to the control group. No group differences were observed in decision-making under risk (GDT; main effect of group: $F(1,29) = .214$, $p = .647$). We also encountered a decrease in the FRN amplitude (Valence x Group: $F(1,32) = 5.016$, $p = .032$), a general reduction of the theta (main effect of group: $F(1,32) = 5.424$, $p = .026$) and delta activities (main effect of Group: $F(1,32) = 7.731$, $p = .009$), and a reduced delta-index (Valence x Group interaction: $F(1,32) = 4.168$, $p = .049$) in the mTLE-UHS group compared to the control group. The late beta-gamma activity was similar in both groups (main effect of Group: $F(1,32) = .777$, $p = .385$; Valence x Group: $F(1,32) = .690$, $p = .412$). These measures were not affected by the surgery (interactions involving group and session: p-values > 0.1).
Conclusions: Our findings contributed to delineating mesial temporal lobe structures' role in the reward system, replicating, expanding, and enriching results provided by previous investigations. The mTLE-UHS patients showed deficits in evaluating external outcomes (both positive and negatives) and were biased toward negative evaluations. They were also impaired in learning from feedback and creating correct expectations of the outcomes, which compromised their decision-making. Additionally, the unilateral surgical resection of these structures might not contribute to a worsening of these impairments in the mTLE-UHS population.

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03 Transauricular Vagus Nerve Stimulation in Patients With Disorders of Consciousness

Samuel Lopez Rodriguez[1] , Myrtha O´Valle Rodriguez[2] , Marta Gomez-Herranz[2] , Estrella Mckenna Blanco[1] , Maria Dolores Navarro Perez[2] , Enrique Noé Sebastián[2] , Alejandro Galvao Carmona[1,2]

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Objective: It is estimated that 420,000 patients in Spain suffer from disorders of consciousness (DoCs), either minimally conscious state (MCS) or vegetative state (VS), a pathology whose correct diagnosis through behavioral scales is very difficult. For this reason, it is necessary to complement these diagnoses with other techniques, like the electroencephalography. In this way, it is known that the characteristics of the P300 are very linked to the level of consciousness. On the other hand, the transauricular vagus nerve stimulation (taVNS) has been recently used in patients with DoCs, as a stimulation method. Objectives: The first objective of this study was to determine the feasibility and efficacy of taVNS in patients with DoCs, according to the modification of the P300 characteristics.
Participants and Methods: Fourteen patients with DoCs participated in this study, of which six were in VS and eight in MCS. At first, patients underwent an oddball paradigm, in which 150 or 300 deep tones (standart, 100 Hz) and 50 or 100 high tones (deviant, 2000 Hz) appeared. In addition, patients were asked to focus on the high tones. Simultaneously, electroencephalographic activity was recorded using a 8-channels cap, in order to determine the characteristics of P300. After this first part, patients were treated with the taVNS during twenty sessions. Then, about a month later, patients underwent again the oddball paradigm and the electroencephalographic activity was recorded again. Finally, electroencephalographic data was analyzed, in order to determine differences in the latency and amplitude of the P300 between VS and MCS, as well as between the pre-taVNS and post-taVNS session.
Results: Electroencephalographic analysis revealed that there were hardly any significant differences in the latency study of the P300. However, the study of the amplitude was significant in most cases. In this way, deep and high tones were significantly different, as a general rule. In addition, MCS and VS groups

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were also significantly different, as well as pre-taVNS and post-taVNS sessions. However, this result was not equivalent for all channels and VS patients did not always show significant differences between tones or sessions.
Conclusions: taVNS could be a very effective stimulation method in patients with DoCs, especially in MCS patients. In this way, the differences in the P300 amplitude between pre-taVNS and post-taVNS sessions would indicate an increase of the level of consciousness in these patients.

This research has been undertaken in the framework of the MSCA-RISE-H2020 Grant entitled DoCMA (EC grant agreement # 778234).

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04 Brain Electrical Activity in Emotional Processing in in Low-Risk Preterm-Born Adults

M. Acebo Garcia-Guerrero[1] , Lexuri Fernández de Gamarra-Oca[1] , Natalia Ojeda del Pozo[1] , Begoña Loureiro[2] , Andrea Sierra-Ibarbia[2] , Javier Peña-Lasa[1] , Naroa Ibarretxe Bilbao[1] , Leire Zubiaurre-Elorza[1]

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Objective: Low-risk prematurity has been scarcely in adults, and little is known about their long-term outcomes. Among the possible biological, psychological, and social consequences, social cognition has been barely studied and nothing is known about the brain electrical activity during social cognition tasks in this population. Social cognition includes domains such as emotion recognition, which has been traditionally approached through emotional expressions of static faces. However, recent studies are shown that other emotional domains such as voice or body movements are relevant in the process of emotion recognition. Therefore, the aim of the present study is to compare the electrical activity of low-risk premature to full-term adults during an emotional recognition task that includes face expression, voice, and body movement.
Participants and Methods: The sample consisted of 43 participants, 28 of them low-risk preterm (30 to 36 weeks of gestational age (GA)) and 15 full-term individuals (37 to 42 weeks' GA), of both sexes and aged between 16 and 38 years old. An Electro-cap International of 32 channels was used, referenced to the left mastoid. Impedances were all below 5 Ω. A Brain Amp was used to amplify the signal. A band-pass filter from 0.001 to 100 Hz and a Notch Filter from 0.1 to 0.30 were applied. Data were recorded with Brain Vision Recorder software. It was used a congruence/incongruence task where the participant observed videos of an actor expressing different emotions and after each video, a word of an emotion was presented. Participants had to answer if the word of the emotion matched with the one expressed in the video. It resulted in four conditions: congruence and incongruence of happiness. Happiness condition was analyzed in electrodes C3, C4, CPZ, and CZ were analyzed.
Results: The expected negative component around the 400ms (N400) was found. The visual analysis revealed a time window between 400 and 480ms. Results showed that the congruence vs incongruence conditions were significantly different in some of the electrodes: C3 (full-term: $t = 3.15$, $p = .007$; Preterm: $t = 3.07$ $p = .005$), C4 (full-term: $t = 2.76$, $p = .015$; Preterm: $t = 2.19$, $p = .037$), CPZ (full-term: $t = 2.58$, $p = .022$; Preterm: $t = 2.89$ $p = .007$) and CZ (full-term: $t = 2.37$, $p = .033$; Preterm: $t = 4.02$ $p \leq .000$). Nevertheless, the comparison of the differences between conditions showed no significant differences between groups for any of the electrodes analyzed ($F = .09$, $p \geq .005$).
Conclusions: Therefore, our results suggest that low-risk prematurity seems to not influence the brain electrical activity during emotional recognition tasks of adults. The use of multimodal stimuli in emotion recognition increases the ecology of the experimental task. The significant N400 in frontal regions supports that this type of stimuli can be used to study emotional processing in tasks that elicit N400.

Coffee Break

11:30- 12:00h
Thursday, July 7, 2022

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Poster Session 02

11:30- 12:00h
Thursday, July 7, 2022

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01 Randomized clinical trial of INtegral Cognitive REMediation (INCREM) program for major depression.

Muriel Vicent-Gil[1] , Sara González-Simarro[1] , Beatriz Raventós[1] , Javier Vera[1] , Eduardo D. Marín-Martínez[1] , Carlota Sabaté-Cao[2] , Josefina Pérez-Blanco[1] , Dolors Puigdemont[1] , Javier de Diego-Adeliño[1] , Carlo Alemany[1] , Jèssica Valverde[1] , Maria Serra-Blasco[3] , Narcís Cardoner[4] , Maria J. Portella[1]

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Objective: Despite achieving clinical remission, patients with depression encounter difficulties to return to their premorbid psychosocial functioning. Cognitive dysfunction has been proposed to be a primary mediator of functional impairment. Therefore, the new non-pharmacological procognitive strategy INtegral Cognitive REMediation for Depression (INCREM) has been developed with the aim of targeting cognitive and psychosocial functioning, as symptomatic remission may be an insufficient goal of treatment for depression.
Participants and Methods: This is a single-blind randomized controlled clinical trial with three treatment arms. Fifty-two depressed patients in clinical remission, with psychosocial difficulties and cognitive impairment, were randomly assigned to receive INCREM intervention, Psychoeducation programme, or treatment as usual. Patients were assessed before and after the study period, and six months after. The main outcome was the change of patients' psychosocial and cognitive functioning.
Results: The analysis showed a significant improvement in psychosocial functioning in the INCREM group, especially six months after the intervention, compared to patients who received the psychoeducation programme. An improvement in cognitive performance was also observed in the INCREM group.
Conclusions: These results provide preliminary evidence on the feasibility and potential efficacy of the INCREM program to improve not only cognitive performance but also psychosocial functioning in clinically remitted depressed patients, and such improvement is maintained six months after. It can be speculated that the maintenance is mediated by the cognitive enhancement achieved with INCREM.

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02 Cognitive Rehabiltation Improves Postural Stability in Patients with Parkinson's Disease

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Objective: 40% of patients with Parkinson's disease (PD) fall at least once a year. Given the possible relationship between some cognitive processes and postural stability, the objective of this study was to create a cognitive rehabilitation protocol that improves postural stability in these patients.
Participants and Methods: 36 patients with PD were recruited and divided into two groups (experimental-control and control-experimental), they underwent 3 measurements (A, B, and C) in which postural stability and motor symptoms were measured (o evaluated) through the Biodex platform and the UPDRS III scale, respectively. Cognitive therapy was performed by both groups at different times and consisted of 12 30-minute rehabilitation sessions from home through the NeuronUP platform. The therapy was focused on improving processing speed and attention.
Results: There was an interaction effect on the Limit of Stability (LOS) variable (p= 0.036), the control-experimental group significantly improved the LOS score (p= 0.007) between measurement B (before therapy) and measurement C (after therapy). No significant

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differences were observed in the group that performed the therapy first. There was an interaction effect on the UPDRS III variable (p= 0.001), the control-experimental group significantly improved the UPDRS III score (p= 0.017) between measurements B and C. The group that performed therapy first also improved after therapy (p = 0.017), returning to baseline scores one month after completion (p = 0.009).
Conclusion: Cognitive therapy improved motor symptoms and postural stability in patients with PD opening a rehabilitation strategy for fall prevention.

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03 Virtual reality-based neuropsychological intervention in patients with mild cognitive impairment or dementia

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Objective: The increase in life expectancy has led to the progressive aging of the population and, consequently, to an increase in the prevalence of age-related disorders such as mild cognitive impairment (MCI) and dementia. This has resulted in a need to design and evaluate the effectiveness of new neuropsychological intervention tools to address cognitive impairment in this population. Therefore, the present study aimed to know the efficacy of virtual reality-based (VR) neuropsychological interventions on cognitive functioning in patients with MCI or dementia through a systematic review of the literature.
Participants and Methods: This review followed the recommendations of the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement and was registered in PROSPERO. The reviewed studies were retrieved from PsycINFO, Web of Science, Pubmed/MEDLINE, Embase, Scopus, and Cochrane Library databases.
Results: The systematic search yielded 249 articles, of which 19 were selected (17 randomized controlled trials [RCTs] and two quasi-experimental studies). The results showed that 76.47% of the RCTs found a significantly greater cognitive improvement after the VR-based intervention compared to the control intervention in at least one cognitive domain. In turn, 100% of the quasi-experimental studies found significant cognitive improvements following VR-based intervention. Specifically, VR-based neuropsychological interventions were effective in improving memory and visuospatial skills.
Conclusions: These results suggest that VR-based intervention is a beneficial approach to improve cognitive functioning in older adults with MCI or dementia. This could have relevant implications for clinical decision-making with these patients.

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04 Virtual Reality in Neuropsychological Intervention Programs for People with Intellectual Disabilities

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Objective: The object of study of the present work was to compare the impact of the use of VR on higher cognitive functions, as a tool in neuropsychological intervention programs in people with intellectual disabilities.
Participants and Methods: The sample was formed by 19 people with mild-moderate intellectual disabilities, users of the CIVITAS Occupational Center with an age $\chi = 41.19$ years. All participants were part of a cognitive stimulation program, where they received a total of 40 sessions of 1 hour, twice a week. The sample was divided into three experimental groups: Virtual Reality (VR) received all sessions in VR, Mixed (VR + Digital Whiteboard (DW)) received 20 sessions in VR and 20 in D.W. and Digital Whiteboard all sessions were taught in D.W.

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The VR sessions used The Lab, Goaltender and Snow Games software from the Steam VR platform, NeoTrie VR (created by the Virtual Dor company) and La Isla VR (created by CIVITAS Association). For the DW sessions, activities created in power point, free use resources in digital format and the Smart Brain platform were used.
Results: The neuropsychological assessment instruments used were: Orientation Questionnaire, A Test, Direct/Reverse Weschler Verbal Span, Corsi, TAVEC, COWAT, Simple King Figure (SKF), 5 Digits test and Decide Task (food and circles). As statistic, the T-Student was used for related samples. When analysing the related data, highly significant statistical differences were found in spatial orientation (t= 3.024; df= 18; p≤.007), in SKF short-term memory (t= 4.357; df= 18; p≤ .000) and in the decrease of errors in Decide Circles (t= -3.426; df= 18; p≤.003) and statistically significant differences in SKF long-term memory (t= 2.740; df= 18; p ≤.013). In experimental groups, statistically significant differences were found in the VR group in SKF short-term memory (t= 2.525; df= 6; p≤.045). In the Mixed group there was a statistically significant decrease in errors in the Decide Food task (t= -4.568; df= 5; p≤.006), an improvement was also found in SKF short and long-term memory and although the data were not statistically significant, they were close (t= 2.498; df= 5; p≤.055), (t= 2.467; df= 5; p≤.057) respectively. In the whiteboard group, statistically significant data were found in the SKF copy (t= 2.678; df= 5; p≤.044).
Conclusions: Although there was a generalized improvement in the different cognitive areas evaluated, statistically very significant or significant differences were only found in spatial orientation and in both long- and short-term memory of visual material as well as in the decrease of errors in the Decide task due to its way of presentation predominantly visual. This may be explained by the use of VR as an intervention tool, as both VR group and the mixed group, worked with VR, the visual area, the visuospatial and visuoperceptive functions have been significantly favored as they've been able to perform cognitive tasks with a more immersive and three-dimensional character.

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05 The Efficacy of Errorless Learning and Goal Management Training in Parkinson's Disease

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Objective: Individuals with Parkinson's disease (PD) often experience difficulties with planning skills and goal directed behaviour. Goal management training (GMT) is a successful treatment for these deficits and helps to structure activities in daily life. The acquisition of the GMT strategy and its application in everyday tasks, however, relies on self-control and error monitoring, which are impaired in many patients with executive problems. Consequently, errors that occur during standard trial-and-error learning may not be detected or corrected and may interfere with the correct application of the GMT algorithm. Previous research has shown that preventing errors during learning, also known as errorless learning (EL), enhances GMT treatment effects in stroke and traumatic brain injury. Our primary objective is to examine the efficacy of a combined Errorless Learning and Goal Management Training intervention for treatment of cognitive complaints in Parkinson's disease. In addition, we will gain more insight into the underlying mechanisms of EL.
Participants and Methods: In this assessor-blind randomized controlled trial, 52 PD patients will be recruited. Participants will be randomly allocated to the combined errorless learning GMT or conventional GMT (using trial-and-error learning). Both treatment arms consist of 8 sessions in which two self-chosen IADL tasks that rely on executive functioning are (re)learned. Task performance will be measured at baseline, post-treatment and at follow-up with a standardized scale evaluating competent, ineffective, and missing task steps. Besides a neuropsychological assessment, secondary outcome measures are subjective experience of executive deficits measured with the BRIEF-A and Goal Attainment Scaling (GAS). Health-related quality of life is

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measured by the Parkinson's Disease Questionnaire (PDQ-39). To gain more insight into the underlying mechanisms of EL, the relationship between (improvement on) everyday tasks performance and executive functions (including error monitoring), as well as explicit and implicit memory will be investigated. A computerized modified Attention Network Task (ANT) with an error monitoring component was developed and will be administered in the PD group and in 30 matched healthy controls as a measure for error monitoring.
Results: To evaluate the efficacy of EL-GMT compared to conventional GMT, pre- and post-training data will be analysed using analysis of covariance (ANCOVA) with post-treatment measurement as dependent variable, treatment condition (EL-GMT and conventional GMT) as between-subject factor and pre-treatment measurement as covariate. Moreover, to evaluate error monitoring in our patient group, their results on the ANT will be compared to 30 matched healthy controls using analysis of covariance (ANCOVA).
Conclusions: In summary, the aim of this ongoing study is to examine the feasibility and efficacy of a combined EL-GMT program that can be used in PD neuropsychological rehabilitation practice. This study will contribute to improved treatment of executive deficits and an improved everyday functioning in persons with PD and to a better understanding of the underlying mechanisms of errorless learning.

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06 Impact of Cognitive Intervention Program on Cortisol Awakening Response in Mild Cognitive Impairment

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Objective: The current study aimed to investigate the impact of a cognitive intervention program based on exposure to recent autobiographical memory captured with a lifelogging wearable camera on cortisol awakening response (CAR) in older adults with amnesic mild cognitive impairment (aMCI).
Participants and Methods: Seventeen individuals (nine men and eight women) diagnosed with aMCI recruited from memory clinics in Consorci Sanitari de Terrassa, Terrasa (Spain) were included in the present study following a quasi-experimental design with a single intervention group. Participants were exposed to an intervention program in eight, individualized, weekly sessions. The intervention program consisted of the exhibition of a 3-minute film related to one episode of their daily activities 4 consecutive times. After the last 3 exhibitions, a set of questions were asked to participants to elicit additional details of the event. These eight different films (one film per each session and episode) were produced from a selection of all pictures collected by wearable camera during previous 15 consecutive days while participants were doing their daily activities. Participants provided three saliva samples (immediately, 30 and 45 minutes after awakening) to measure the CAR in three time points (immediately pre and post intervention program, and three months later). As salivary cortisol values did not have a normal distribution, they were log transformed. ANOVAs for repeated measures were used to investigate possible differences across saliva samples and time points. All p-values reported are two-tailed, and the level of significance was set at $p = 0.05$. Statistical analyses were performed with SPSS 22.0.
Results*:* As expected, the “saliva sample” factor was significant [$F(2, 22)= 8.714$, $p=0.002$]. Overall cortisol levels immediate after awakening were lower than 30 ($p =0.003$) and 45 ($p= 0.023$) minutes after awakening.

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Although the highest cortisol levels were reached 30 min after awakening this difference was not significant (30 min vs. 45 min: p > 0.99). In addition, we found an effect of the intervention program when the time points pre intervention and three months later were considered [F(1, 12)= 4.987, p=0.045]. Thus, the cortisol levels were lower immediately pre intervention than three months later, being this latter CAR pattern more typical of a healthy HPA axis functioning [F(2, 24)= 6.936, p=0.004].

Conclusions: The present study provides preliminary evidence that the cognitive intervention program based on the exposition to recent autobiographical events could help to regulate the hypothalamic-pituitary-adrenal (HPA) axis functioning in aMCI patients three month after the intervention. Hence, the CAR could be a possible biomarker that helps to know if an intervention program based on autobiographical memory has potential beneficial effects in older people diagnosed with aMCI. Nevertheless, further research should consider control group to confirm these preliminary findings.

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07 Children with Cerebral Palsy Improve their Social Cognition After Completing a Home-Based Intervention

María García-Galant [1,2,3] , Montse Blasco[1,2,3] , Paula Moral-Salicrú[1] , Alba Berenguer-González[1] , Olga Laporta-Hoyos[1,2,3] , Xavier Caldú[1,2,3] , Júlia Ballester-Plané[1,2,3] , Júlia Miralbell[1,2,3] , Roser Pueyo[1,2,3]

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Objective: Children with cerebral palsy (CP) have social cognition difficulties that impact their everyday life. Rehabilitation interventions in children with CP mainly target motor impairment, which is the central diagnostic feature of CP. Some interventions are focused on cognitive associated impairments, but it is unknown if these interventions exert short- and long-term improvements in social cognition. The aim of the present study is to explore whether a computerized executive function training programme can improve social cognition functioning in children with CP. The potential retention of intervention effects 9 months after completing the assessment is also explored.

Participants and Methods: Sixty children with CP were paired by age, sex, motor, and intelligence quotient (IQ) and then randomized to intervention or usual care. Thirty participants (8 to 12 yo, mean age 10.29, SD 1.65; 15 females) underwent a home-based computerized executive training programme that also includes social cognition tasks (12 weeks, 5 days a week, 30 minutes per day training, total dose 30 hours). The remaining thirty children (mean age 10.01, SD 1.73; 15 females) were assigned to the usual care wait-list group. Motor severity of the 60 children was mild and IQ ranged from 75 to 125.

Social cognition was assessed by the Theory of Mind and Affect Recognition subtests from the Developmental NEuroPSYchological Assessment-II (NEPSY-II). Assessments were performed at three time points: before, immediately after and 9 months after completing the training. Social cognition differences between groups were assessed by analysis of covariance, including pre-training performance as a covariate. Strengths and Difficulties Questionnaire (SDQ), Autism Spectrum Screening Questionnaire (ASSQ), Parental Stress Scale (PSS), Beach Center Family Quality of Live Scale (fQOL), and pain frequency were also included as covariates.

Results: The intervention group showed a significantly better performance immediately after training in Affect Recognition (F=6.9, p=.011, =.126) but not in Theory of Mind (F=.6, p=.435, =.085). Improvements in Affect Recognition were maintained 9 months after training (F=4.5, p=.039, =.074). In addition, although Theory of Mind improvements were not reported just after intervention finished, delayed effects were found 9 months later (F=11.8, p=.001, =.179).

Conclusions: Undergoing an executive function training programme exerts a positive effect on social cognition. Results also support the retention and, interestingly, the long term-effects of this intervention. Our findings highlight that including social cognition tasks on cognitive interventions in children with CP could be a cost-effective intervention with short- and long-term effects.

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08 Core Executive Function Improvements in Children with Cerebral Palsy After a Home-Based Intervention

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Objective: Children with cerebral palsy (CP) present motor disorders and may also show executive function impairments. Executive function difficulties persist into adulthood and have been associated with a lower quality of life in this population. Most of the current interventions require participants to travel to receive their training, which may reduce adherence and efficacy. The present study aims to assess whether a home-based computerized training programme improves executive functioning when compared to usual care. **Participants and Methods:** Sixty participants (30 females) with CP (8 to 12 years old) were paired by age, sex, motor, and intelligence quotient (IQ) and then randomized to intervention or usual care wait-list groups. The thirty children of the intervention group underwent a home-based computerized executive training programme during 12 weeks (5 days a week, 30 minutes a day training, total dose of 30 hours). Executive functions were assessed in terms of core and higher-order executive function, according to Diamond (2013). As for core executive functions, inhibitory control was measured by Digit Span (Wechsler Intelligence Scale for Children – Fifth Edition, WISC-V), Spatial Span (Wechsler NonVerbal, WNV) and Auditory Attention Total Score (Developmental NEuroPSYchological Assessment-II, NEPSY-II). Working memory was assessed through Digit Span Backward (WISC-V) and Spatial Span Backward (WNV), and cognitive flexibility was measured by Response Set Total Score (NEPSY-II). Higher-order executive functions were assessed by the Tower test (Delis-Kaplan executive Function System, D-KEFS). Executive function assessments were undergone at three time points: before, immediately after and 9 months after completing the training. Core and higher-order executive function differences between groups were examined by analysis of covariance, including pre-training performance as a covariate. Strengths and Difficulties Questionnaire (SDQ), Autism Spectrum Screening Questionnaire (ASSQ), Parental Stress Scale (PSS), Beach Center Family Quality of Live Scale (fQOL), and pain frequency were also included as covariates. **Results:** The intervention group showed improvements immediately after training in the three core executive function outcomes (inhibitory control, working memory and cognitive flexibility). Specifically, performance in Spatial Span (F=8.8, p=.005, =.155), Spatial Span Backward (F=8.4, p=.005, .143) and Response Set Total Score(F=6.4, p=.015, =.117) improved after completing the intervention. In addition, delayed effects were found in Digit Span (F=6.8, p=.012, =.120), Digit Span Backward (F=4.0, p=.050, =.078) and Response Set Total Score (F=4.2, p=0.05, =0.080) 9 months later, showing long-term effects in inhibitory control and working memory, cognitive flexibility, respectively. Improvements in higher-order executive functions were not found after intervention. **Conclusions:** A specific executive function training exerts a positive effect on core executive functioning in children with CP. Short-term and long-term effects were found in inhibitory control, working memory and cognitive flexibility. In line with previous results in other populations, our study indicates that core executive functions improve with a home-based computerized training. Future research may clarify if the effect of home-based computerized interventions may extend to higher-order executive functioning and their everyday performance.

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09 Approach-Avoidance Bias Modification Training for Excess Weight

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Objective: Obesity is at least partly driven by unhealthy food choices related to approach bias for unhealthy food (an automatic tendency to move towards appetitive cues) and avoidance bias for healthy food (an automatic tendency to move away aversive cues) (Kemps & Tiggemann, 2015). The present study aims to

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explore the efficacy of the approach-avoidance training (AAT) to reduce those bias in people with overweight and obesity.
Participants and Methods: Ninety-six participants (82 females) with excess weight (BMI between 30 and 39 kg/m^2) with a mean age of 44,37 years (SD = 6,72) and a mean of 16,14 years of education (SD = 6,70) were recruited via social media. Participants were randomly assigned to 3 groups: verum AAT (n=33); sham AAT (n=35); and control (28). AAT was completed daily for 1 week (approximately 5 minutes per day) using the Tilt Task app (Kakoschke et al., 2018). In this task, participants in the verum AAT group must zoom in or zoom out a food image according to its format (vertical or horizontal) using their smartphone device. Specifically, 90% of healthy food images appear in the format to be approached (for example, vertical), while only 10% of unhealthy images appear in that format (to ensure concentration on the task). The format to be approached was counterbalanced. For the sham training, the approach-avoidance ratio of the healthy and unhealthy food images was 50%. The control group did not receive any cognitive training. The approach-avoidance bias was calculated for all participants before and after the training with the Tilt Task using a 50% ratio (approach and avoidance trials are 50% for healthy and unhealthy foods).
Results: Two mixed-model ANOVA were used to test effects on approach bias to healthy food and avoidance bias to unhealthy food with a 3 (group: verum ATT, sham ATT and control) x 2 (time: pre-training and post-training) design. Results showed a significant interaction both for the approach bias to healthy food (F (3, 81) = 4,840, p = .010) and for the avoidance bias to unhealthy food (F (3,81) = 4,994, p = .009), with the verum AAT group showing greater changes in both bias than the other two groups, that showed no improvements.
Conclusions: We showed that one week AAT reduced approach bias for unhealthy food and avoidance bias for healthy food in people with excess weight. This strategy is promising as target a cognitive bias underpinning food choice rather than relying on the individual ability to maintain a restrictive diet and physical exercise. This could prove an important target in obesity treatments.

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10 Inhibitory Control Training for People with Excess Weight

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Objective: multiple factors are involved in the origin and maintenance of overweight and obesity. The so-called cognitive bias modification have emerged as interventions that can be complementary to the standard treatments. Cue-specific inhibitory control trainings have been designed to modify the "go" response bias triggered by palatable or energy-dense food stimuli. The aim of the study was to determine the effectiveness of an inhibitory control training (ICT) to reduce this bias in people with overweight and obesity.
Participants and Methods: Sample was composed by 77 participants (85% females) recruited via social media from the general population. As an inclusion criterion, Body Mass Index should was between 25 and 39.9. Mean of age was 44 years (SD = 6.7), and mean of schooling years was 16 (SD = 6.7). Participants were randomized to a verum ICT group (N=26), a sham ICT group (N=26), or an inactive control group (N=25). The Food Trainer mobile app (active or sham version) was used to train by the two first groups. Training consisted on one session per day for one week. Each session contained 96 trials and lasted about 4 min. Each trial consisted of an image appearing on a random location on the screen closely followed by a green (Go-cue) or red (No-Go cue) circle around the image. Participants should tap images (healthy food, unhealthy food, objects) with a green circle and refrain from tapping images with red circles. In the verum training 25% of trials paired an unhealthy food with a No-Go cue, 25% a healthy food with a Go-cue, 25% a control image with a Go cue, and 25% the same control images with a No-Go cue. In the sham version healthy/unhealthy foods were paired with Go-No Go cue at a 50% ratio. The control group did not receive any cognitive training. The sham version was used in the assessment pre and post-intervention to calculate the difference between the reaction times to healthy foods and reaction times to filler trials.
Results: After removing outliers, a mixed-model ANOVA was applied to test the effects on inhibition control to unhealthy food with a 3 group x 2 times design. Results showed a significant interaction effect for the reaction time (F (3, 67) = 7.734, p = .005). Both trained groups showed greater changes than the control group. The verum ICT group showed better inhibitory control than the sham group.

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Conclusions: The inhibitory control trained during one week improved the specific healthy food go- and unhealthy food no-go associations and therefore the inhibitory control in people with excess weight. This finding is in line with newer approaches to weight reduction, which are directly aimed at modifying some food-related cognitive biases involved in response habits.

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11 Feasibility and safety of a fully immersive virtual reality program in stroke patients: Preliminary data

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Objective: Virtual Reality (VR) is a new technology increasingly used in rehabilitation. This study aimed to investigate the feasibility and safety of a fully immersive VR program in patients with stroke at the early stages of cognitive and motor rehabilitation.
Participants and Methods: Patients with stroke, (acute/subacute, in a rehabilitation phase) MiniMental≥18, participated in a cognitive and motor skills training program through VR using a head-mounted display (HMS). The exercise environment included two different scenarios. The Suitability Evaluation Questionnaire (Gil-Gómez et al.), used to evaluate feasibility and safety, includes 13 closed-ended questions and one open-ended question. Two evaluations were carried out: at the first and last session. The sessions were applied by a multidisciplinary team, which recorded difficulties in the interaction and use of the equipment. Values are at the median (25th-75th percentile).
Results: A total of 27 sessions, each lasting 8-12min, were performed. Patients with motor [FI: 60.5(38.25-70)] and mild cognitive [MiniMental: 22.5(19.5-26.25)] deficits participated. No complications were noted. The SEQ score rated at the 1st session was 61(58-62) and 61(48-63) at the last one. The appearance of dizziness, nausea, and disorientation was reported by only one patient (3/12 sessions); these were of a mild degree, and not any session interruption was necessary. In addition, the therapists reported that the apps were very easy to use.
Conclusions: These preliminary data indicate that immersive VR environments can a) be usable, and safe, and b) they can be used as a rehabilitation tool even in the early stages of rehabilitation in patients with stroke. Further, large-scale longitudinal clinical trials are needed to identify all the benefits that these patients may have. Future studies should further investigate the long-term impact of the combination of cognitive and motor interventions using immersive VR.

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12 Virtual Reality for Cognitive Enhancement in Elderly People. Preliminary Results.

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Objective: The use of virtual reality (VR) in cognitive stimulation has been scientifically proven in different populations, including elderly people with and without cognitive decline. VR allows the user to live an immersive experience which, combined with a methodology based on cognitive stimulation, could become a playful intervention tool for cognitive rehabilitation or enhancement.
Here, we study whether VR combined with cognitive stimulation is more effective in enhancing cognitive functions in elderly people than conventional cognitive stimulation.
Participants and Methods: 58 adults, 60-86 years old, who attend a public active participation center, have participated in the study. Participants were randomly allocated in two experimental groups: 1) VR group: receiving cognitive stimulation combined with VR intervention; 2) Non-VR group: receiving cognitive and emotional stimulation.
The interventions lasted 3 months, including one session per week (12 sessions total) and session duration was 80 min approximately.

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To study the changes we assessed all participants before and after the intervention using the following measures: Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MOCA), Frontal Assessment Battery (FAB), Trail Making Test (TMT), subtest of WAIS-IV (digit span, arithmetic, letter-number sequencing), Yesavage Depression Scale (reduced version), and Barthel Index.
Results: The repeated measures ANOVAs on the MMSE and MoCA scores showed a significant interaction effect between time and group (MMSE p = .006; MoCA p = .008). Where participants in the VR group improved significantly after intervention (MMSE pre: 28.4; post: 29.4; p < .001; MoCA pre: 23.9; post: 25.9; p < .001). Whereas the participants in the Non-VR group didn't show any improvement between pre- and post-intervention on those measures (MMSE pre: 28.8; post: 28.6; p = .57; MoCA pre:23.4; post: 22.5; p = .35).
Regarding cognitive specific processes tests, the performance of participants in the Non-VR group worsened in the TMT-B score between pre- and post-intervention (pre: 144.4; post: 173.4, p < .05), whereas those in the VR group performed the same (pre: 127.5; post: 122.6; p = .49).
Both groups improved their performance after the intervention in the arithmetic WAIS-IV subtest (VR group, pre: 12.5; post: 14.3; Non-VR group, pre: 10.8; post: 11.5; p < .01). There were no statistically significant differences in any other test when compared pre- and post-intervention performance.
Conclusions: The results of our study support the evidence that VR may enhance the benefits of cognitive training in older adults, as shown by an improvement in the test scores for global cognition. Additionally, the evidence that executive functions did not decline in the VR group might suggest that VR helps to reduce the progress of cognitive decline.
These results support the benefits of including VR in the public services addressed to promote brain health and independent living in older people.

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13 Online Rehabilitation Program for Conduction Aphasia With a Verbal Amnesic Disorder: A Case Study.

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Objective: Assess the effect of a verbal short-term memory (VSTM) online rehabilitation program on the linguistic competencies of a patient with conduction aphasia and a reduced memory span.
Participants and Methods: The participant was a 54-year-old man with conduction aphasia secondary to a hemorrhagic cerebrovascular accident of the middle cerebral artery followed by non-surgical treatment. The clinical presentation of the language syndrome consisted of impairments in language comprehension in complex orders or sentences longer than 3 words. He also presented naming deficits and reduced VSTM span. The rest of the cognitive domains had no significant decrease. We implemented a pre-post test evaluation for language with the Western Aphasia Battery (WAB) (Kertesz, 1984). Additionally, we assessed verbal and non-verbal short-term memory, long-term memory, and general cognition. Difficulties at VSTM affected general language comprehension. We implemented a treatment consisting of a 3-stage basis: a) naming treatment, b) Item Order Memory Task (Nittrouer & Miller, 1999) for verbal short-term span increase, and c) memory consolidation.
Results: The patient showed differences in VSTM performance with a 3-word span at pretest and a 6-word span at post test. Significant progress was observed at WAB assessment of: comprehension (pre-test=8.45, post-test =8.85), repetition (pre-test=5.9, post-test=8.2) and naming (pre-test=9.2, post-test=10).
Conclusions: Previous research on aphasia patients had reported low efficiency of online memory rehabilitation on language skills (Murray, Salis, Martin & Dralle, 2018); in contrast, our findings showed a significant increase in language performance after the memory treatment. In most aphasia studies language assessment does not include memory evaluation. The low reliability of online rehabilitation might be due to the difficulty in the identification of amnesic disorders. VSTM difficulties can be missed on aphasia evaluation due to an overlap of language and memory symptoms. Online rehabilitation can improve language skills by increasing VSTM span despite the inherent difficulties aphasia provides. Further research is necessary in order to strengthen the relevance of tracing amnesic disorders on patients with aphasia.

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14 Cognitive Intervention Programs in Minors Belonging to Disadvantaged Contexts in Spain: A Systematic Review

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Objective: The promotion of a healthy and inclusive development for every person is at the core of international strategies like the 2030 Agenda for Sustainable Development, with the goal of leaving no one behind. However, previous studies show a strong influence of socioeconomic status (SES) on human development. The evidence shows that exposure to risk contexts in the earliest stages results in hazards in the cognitive development for children and adolescents. To alleviate these consequences and favor development, different cognitive training programs have contributed to the field by identifying efficacy criteria. Nevertheless, in Spain it seems to be very few trials with this purpose. This systematic review will identify and synthesize the evidence of cognitive intervention studies implemented with groups at psychosocial risk carried out in Spain.
Participants and Methods: Keywords were adapted to the databases Web of Science, PubMed, Medline, Dialnet, PsycInfo, PsycArticles, Psychology and Behavioral Sciences Collection and ERIC. Year of publication filters were not applied. Only studies published in English or Spanish and developed in Spain that included interventions applied in populations from 5 to 18 years of age with a low SES were included.
Results: The analysis of the literature showed only 8 interventions carried out to the present. These interventions indicated an improvement in those cognitive functions worked with minors of low SES. The most worked cognitive domains were executive functions, followed by social cognition and language.
Conclusions: After reviewing the available literature, a clear scarcity of interventions carried out in Spain was observed. In addition, variables such as age, cognitive functions, or personal vulnerability were identified as factors to take into account in future lines of research due to their influence on minors. These findings indicate the relevance of this review study to help make decisions in relation to actions to be implemented by the competent bodies in Spain.

15 Analysis of Some Aspects of Theory of Mind (TOM) During Picture-Based Discourse in Moroccan Patients with AD

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Objective: Connected speech or picture-based discourse implies different processes in terms of neuro-cognitive and neurolinguistic functions which are differently impaired in Alzheimer's disease (AD). Several studies described these impairments in European languages; however, no study characterized them in Arabic. TOM (theory of mind) is a hidden aspect in oral description of picture and has the potential to reveal a wide range of cognitive-linguistic patterns in AD. Given this potential, it is important to analyse the overlapping between these processes in connected speech in Moroccan arabic.
Participants and Methods: The analysis of speech's sample has been carried out of three patients with moderate Alzheimer's disease from the Alzheimer's Center of Rabat. They described orally the picture of cookies theft subtest (BDAE). They met the clinical criteria for AD (McKhann, 2011). The psycholinguistic variables have been analyzed according to Boschi et al, (2017). A phonetic transcription and thematic description of patients' responses have been analyzed according to Cummings et al (2019).
Results: Referring to the neuro-cognitive model of Cummings (2019), cognitive-linguistic impairments during speech have been produced by our patients. Their descriptions showed certain mental states in relation to the main subjects and actions in picture-based discourse. Lexical and semantic impairments contributed to the reduction of the informational content of their discourse. Words like daydream and forgetfulness are elements of this type of social cognition and inferences. Our patients displayed poor informativeness, dysnomia, and lack of referential cohesion which have been associated with an impairment in theory of mind and morpho-syntax.
Conclusions: Picture-based discourse is a potential marker of TOM in terms of inferences, causal relationships in events and mental state. The concomitant cognitive-linguistic impairments in AD could be analyzed using brief and comprehensive tests such as Cookies theft test.

16 Relationship Between Personality and Cognition Among Caregivers

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Objective: Exposure to stress has consequences on physical and mental health and is associated with lower cognitive performance. However studies conducted with caregivers show inconclusive results. The impact of stress on cognition is modulated by personality: people with high neuroticism use maladaptive coping strategies and present more anxiety. Openness and extraversion are related to problem-focused coping and a tendency to positive reinterpretation. In addition, personality influences information processing in such a way that the disposition of individual traits supposes an advantage or disadvantage with respect to cognitive performance. This study aims to assess the relationship between the personality traits and cognitive performance of caregivers of individuals with Alzheimer's disease (AD).
Participants and Methods: This observational study includes 48 primary caregivers of people with early to moderate AD from the dementia unit of the Vic University Hospital (Barcelona, Spain), over 18 years of age who respond to a cognitive battery that includes general cognitive ability (MMSE), memory (Rey Auditory Verbal Learning Test and semantic fluency), attention (Symbol Digit Modalities Test) and executive functions (phonetic fluency and Trail Making Test). Personality was assessed with the NEO Five Factor Inventory, a self-administered scale that measures the five major personality traits: neuroticism, extraversion, openness, agreeableness, and conscientiousness. Descriptive statistics was calculated and Pearson's correlation with a statistical significance level of 0.05 was applied to determine the relationship between each cognitive test and the personality traits. The analyses were performed with SPSS 28.0 (IBM, 2021).
Results: Caregivers are mainly women (81.3%), with a mean age of 54.8 (10.1) years, with secondary or higher education (80.8%) and married (75.0%). 81.3% are adult children and 12.5% are partners of the person with AD. They show the following results in personality: neuroticism: 55.7 (12.1), extraversion: 44.8(10.9), openness: 47.7 (8.5), agreeableness: 50.7 (10.3) and conscientiousness: 45.8 (10.5). Correlation analysis revealed a significant association between openness and semantic verbal fluency ($r=0.38$, $p<0.01$), and phonemic verbal fluency ($r=0.35$, $p<0.05$). Conscientiousness is associated with semantic fluency ($r=-0.32$, $p<0.05$) and extraversion is associated with MMSE ($r=0.33$, $p<0.05$).
Conclusions: The caregivers' level of neuroticism is high or very high according to the literature. Openness was significantly associated with phonemic fluency (linked to executive processes) and semantic fluency (linked to memory processes). It is possible that high openness facilitates lexical access processes and the cognitive flexibility necessary to respond to fluency tasks, and moderate the impact of stress on cognition.
The negative correlation detected between conscientiousness and semantic fluency may reflect a tendency to carefully think before acting, especially in women.
Extraversion is related to global cognitive performance, which is consistent with previous studies. The research shows that caregivers' personality has an impact on their global cognitive performance and verbal executive functions. These results indicate the importance of considering the caregiver's personality for the planning of intervention programs.

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17 The Global Deterioration Scale for Adults with Down Syndrome

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Objective: Adapt and validate the *Global Deterioration Scale* (GDS) for staging dementia of Alzheimer type (DAT) in people with Down syndrome (DS).
Participants and Methods: A retrospective cohort study of adults with DS and mild or moderate level of intellectual disability was carried out. The sample consisted in 76 participants (45.96 ± 4.47 years) belonging at the baseline time point of a three years follow-up study of mild cognitive impairment (MCI) and DAT.
The GDS-DS stages for the proposed DAT-DS spectrum were: (1) cognitively stable, (2) subjective cognitive or behavioral impairment, (3) MCI-DS, (4) mild DAT-DS, (5) moderate DAT-DS, and (6) severe DAT-DS.
Two neuropsychologist specialists in DS blinded to the diagnosis of the follow-up study classified each subject with the GDS-DS according to the performance on: (1) *CAMCOG-DS total score* and *abstraction subtest*; (2) TB-DI *orientation*, *semantic fluency (eat)*, *formal fluency*, *memory delay recall* (stories), and *visual discrimination* subtests; (3) the *Behavioural Regulation Index* (BRI) of the BRIEF-P.
Results: All the participants were placed between phases 1 and 5 of the GDS-DS. Any participant was placed in the phase 6 because severe DAT-DS was an exclusion criterion of the follow-up study.
The largest effect sizes were found between phases 2 to 5 of the GDS-DS for the CAMCOG-DS total score (d = 1.16, d = 0.87, d = 0.87) and orientation subtest of the TB-DI (d = 1.40, d = 2.44, d = 1.03).
The inter-rater reliability for classifying with the GDS-DS (κ = 0.86, CI: 0.80 – 0.93) and the agreement with the diagnostic of the follow-up study (κ = 0.82, CI: 0.73 - 0.92) were excellent.
Conclusions: We consider the GDS-DS to be an excellent tool for classifying adults with DS on the DTA continuum, with particular relevance in daily clinical practice and clinical trials.
The *CAMCOG-DS* and the *TB-DI* seem to be two neuropsychological tools well suited to distinguish across the GDS-DS phases.

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18 Utility of Non-Graphomotor Visuoconstructional Tasks for Early Detection of Neurocognitive disorder

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Objective: To explore the usefulness of non-graphomotor visuoconstructional tasks for early identification of Mild Cognitive Impairment (MCI) and Alzheimer's Disease (DA).
Participants and Methods: Seventy-two Brazilian participants volunteered to take part in this study. Participants were classified into three groups following a clinical standardized protocol: Healthy Control (HC, N=31), MCI (N=27) and early AD (N=14). Most participants (age=69.08±6.41) were females (83.3%) and had completed college education (58.3%). Groups did not differ on education level and sex, but the AD group was older than the other groups. An original neuropsychological test [i.e, Three-Dimensional Interlocking Puzzle (3-DIP)] was applied to assess three-dimensional (3D) visuoconstructional skills, avoiding the influence of graphomotor skills. The Three-Dimensional Block Construction task (T-DBC) and one Modified Version of Jigsaw-Puzzle Imagery task (MJ-PI) were also used as measures of comparison.

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Results: Significant differences between the groups were found in all measures and size effects ranged from moderate to large. The 3-DIP showed that HCs had better performance [H (2) = 21.49, p = < .001] than AD (r effect size = .72) and MCI (r effect size = .56). MJ-PI revealed a similar pattern of differences (HC scores >AD = MCI), whereas T-DBC tasks showed the following groups pattern: HC scores = MCI > AD (effect sizes range: .46-.67). Multinomial logistic regression showed that 3-DIP [χ^2 = 8.58, (df = 2), p = .014] and MJ-PI [χ^2 = 24.79, (df = 2), p < .001] predicted significantly the presence of MCI/dementia conditions. A one-point increase in 3-DIP decreased by 60% (1-odds ratio) and 77% the chance of having MCI or AD respectively. Moreover, a one-point increase in MJ-PI decreased by 42% and 64% the probability of MCI or AD diagnosis individually.
Conclusions: 3-DIP was the most useful task to detect MCI and early AD. Our findings highlight the importance of applying non-graphomotor visuoconstructional tasks in clinical protocols aimed to early detection of cognitive impairment in older adults.

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19 Neuropsychological Phenotypes and Biomarkers in Alzheimer's Disease

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Objective: The new definition of Alzheimer's disease (AD) of the National Institute on Aging and Alzheimer's Associations (NIA-AA-2019) workgroup is based on biological criteria and requires the demonstration of pathological accumulation of β amyloid (A+).
However, the diagnosis of AD proposed by the International Working Group (IWG-2021) is focused on clinicobiological items; the presence of a clinical AD phenotype and evidence of amyloid (A+) and tau (T+) pathology is required. Specific AD phenotypes include three common profiles: the amnestic syndrome of the hippocampal type (typical), the posterior cortical atrophy variant, and the logopenic primary progressive aphasia variant. Other phenotypes less commonly related to AD pathology are the behavioural/dysexecutive variant, the corticobasal variant, and the other two variants of primary progressive aphasia (the non-fluent type and the semantic variant).
The objective of the study is to analyze the frequency of the different neuropsychological phenotypes of AD and its pattern of biomarkers in CSF.
Participants and Methods: Patients studied in our unit (population 165.144 inhabitants; 30.937 >65 years) between May-20 and January-22 (21 months) with biomarkers in CSF.
Lumbar puncture and biomarkers study were performed in early dementia or mild cognitive impairment <75 years, and in atypical presentations or suspected mixed dementia, following the Spanish Neurological Society recommendations.
We analyzed demographic and clinical data and values of beta-amyloid (Aβ) 1-42, Aβ1-40, phosphotau (p-tau) and total tau (t-tau). We classified our cases using the ATN system (amyloid-tau-neurodegeneration), considered A+ Aβ values 1-42 <600 pg/dl and/or ratio 1-42/1-40 <0.07, T+ if p-tau >65 pg/dl and N+ if t-tau > 385 pg/dl.
We reviewed the neuropsychological profile of presentation of the A+T+ group, and classified the patients according to their phenotype following the IWG-2021 criteria.
Results: During the study period, 868 new cases were assessed for suspected cognitive impairment. Lumbar puncture and biomarkers study were performed in 115 patients. ATN profile was A+ in 83 cases and A+T+ in 56. The average age was 72,5 years. 62,5% were women. The mean scores in MMSE was 21,7 and GDS was 3 in 28,6% and 4 or more in 71,4%. The mean values of Aβ, ratio 1-42/1-40, p-tau, t-tau were 464 pg/dl, 0.04, 115 pg/dl and 677 pg/dl respectively. High t-tau level (N+) was found in 55 cases (98,2%).
Phenotype review: 42 patients presented amnesic phenotype (75%); 10 patients (17,8%) with behavioural/dysexecutive phenotype; 3 patients (5,3%) with logopenic variant primary progressive aphasia and only 1 (1,7%) with posterior cortical atrophy variant.
There were no statistical differences for clinical variables and biomarkers between groups.
Conclusion: In our series, all A+T+ cases presented a specific neuropsychological phenotype, usually associated with AD pathology.
Most of the patients (75%) presented a typical amnesic phenotype.
The behavioral/dysexecutive was the second most frequent phenotype (17.8%). This high percentage is possibly due to the selection bias

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of patients to perform the study with biomarkers.
We did not find statistical differences in CSF biomarkers between the different phenotypes.

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20 Multidisciplinary analysis for the diagnosis of Alzheimer based on fractal geometry

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Objective: establish sensitivity, specificity and precision (ROC) indicators of fractal dimension and lagunarity measurements of fractal magnetic resonance imaging (MRI) analysis brain of older adults with and without diagnosis of Alzheimer's as a complementary methodological proposal for a multidisciplinary protocol in the improvement of the Alzheimer's diagnostic entity.
Participants and Methods: 16 older adults between 70-80 years of age (Me=74.5±5.3), separated in two groups: 1) with Alzheimer's diagnosis (50%) and 2) without Alzheimer's diagnosis (50%) that met with the approaches of inclusion and exclusion of the study, each approaches focused the absence or history of any type of disease affecting the nervous system (control group) and the neurologically confirmed diagnosis of early-stage (mild-moderate) Alzheimer's disease and showing major neurocognitive disorder; the two groups didn't have statistically significant differences in age factor, schooling and socioeconomic stratum.
Resource: magnetic resonance was performed by the magnetic resonator GE Healthcare SIGNA™, de 1.5T, 3.0T. and the imaging were analyzed by the SAFIRMCA Software (Software for Fractal Analysis of Magnetic Resonance Brain for Alzheimer's), responsible for extracting for each resonator cut the fractal dimension of the cerebral cortex and the lacunarity of subcortical structures.
Procedure: the older adults without the diagnosis of the disease were recruited from government older adult programs, where those who possess high functionality and independence participate in the activities of daily life; the older adults with the Alzheimer's disease were recruited from the neurology institute of the International Hospital of Colombia (HIC) with a history of medical follow-up of their disease, subsequently, a virtual psychological and neuropsychological evaluation was made due to contingencies by COVID-19, with the aim of keeping a record of their cognitive functions and psychiatric status, followed by taking simple cerebral MRI in the HIC, ending with the delivery of results and follow-up in network of caregivers, the images were analyzed by means of the SAFIRMCA program, calculating the fractal dimension and lagunaridad of each cut and subjecting the values by cut to a ROC analysis to determine the sensitivity, specificity and precision.
Results: It was found that the MRI that obtained the highest sensitivity indexes (70-95%) were the measures of lacunarity in the medial temporal structures in the axial sections, meanwhile, the MRI with the highest specificity indexes (80-95%) and accuracy (75-90%) were the fractal dimension of the central coronal and sagittal cuts.
Conclusions: adequate values for the implementation of fractal methodology in the analysis of MRI for the improvement of the diagnostic entity are evidenced, detailing the analysis of medial neuronal structures (hippocampus and limbic structures) and cerebral cortex for discrimination of Alzheimer's disease.

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21 NEURONORMA battery associations with cerebrospinal fluid biomarkers in the continuum of Alzheimer's disease

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Objective: This study is a further validation of the NEURONORMA battery in a sample of individuals with evidence of Alzheimer's disease (AD) biomarkers. Specifically, the present work aims to i) explore the association between cognitive outcomes and cerebrospinal fluid (CSF) Alzheimer's disease (AD) biomarkers and ii) study the effect sizes of the differences in cognitive and CSF measures among Cognitively Unimpaired (CU), mild cognitive impairment (MCI), and mild Dementia of the Alzheimer Type (DAT) individuals.
Participants and Methods: The sample was composed of 112 subjects (42 CU, 35 MCI and 35 mild DAT). The study design was cross-sectional. All subjects were assessed with the NEURONORMA neuropsychological battery (including common tests of attention, language, verbal and visual memory, and executive functions that have been adapted and co-normed in Spanish population) and underwent a lumbar puncture for CSF AD biomarkers measurement: amyloid-β_{42} ($A\beta_{42}$) peptide and of total tau (tTau) and phosphorilated tau 181 (pTau181) proteins. $A\beta_{42}$/tTau and $A\beta_{42}$/pTau181 ratios were also calculated. Correlation coefficients were calculated in overall sample and multivariate regression and effect size values (Cohen's *d*) were obtained to compare the differences among clinical groups.
Results: Correlations between cognitive outcomes and measures involving $A\beta_{42}$were positive, and those Tau CSF measures were negative. Overall, correlations were significant ($p<0.05$) and moderate in intensity, being the highest ones between $A\beta_{42}$/ pTau181 and Free and Cued Selective Reminding Test (FCSRT) and Rey-Osterrieth Complex Figure (ROCF) (*rho*= 0.503 – 0.610). We observed significant lower $A\beta_{42}$ CSF measures ($p<0.05$), $A\beta_{42}$/tTau and $A\beta_{42}$/pTau181 values ($p\leq0.001$) and significant higher Tau values between cognitively impaired groups as compared to CU, and showed no differences between MCI and mild DAT subjects (p= 0.068- 0.203). As expected, cognitive variables show the following trend: CU>MCI>DAT, but many of them showed non-significant differences in the MCI vs DAT comparison ($p>0.05$). The highest effect size values were found in FCSRT scores for the comparison between both impaired groups and CU (MCI $d>2$ and mild DAT $d>3$). Similarly, FCSRT total recalls showed the highest *d* values between MCI and mild DAT (FCSRT delayed total recall d=1.15 and FCSRT total recall d=1.03). Also, ROCF, Tower of London - Drexel version (execution and solving times and total moves) and Stroop Test Color-Word, Symbol Digit Modalities Test (total correct) and animal verbal fluency obtained values $d>2$ for CU and DAT comparison. $A\beta_{42}$/ pTau181 ratio obtained the highest value between CU and cognitively impaired subjects (mild DAT, d=1.56 and MCI d=0.89).
Conclusions: $A\beta_{42}$ and Tau CSF biomarkers were associated to cognitive performance in the continuum of AD, showing moderate correlations. As expected, globally, clinical groups were different with respect to cognitive performances on the NEURONORMA battery showing a greater difference between CU and mild DAT subjects. CSF biomarkers were similar in MCI and mild DAT groups supporting the evidence of AD pathology in early stages of the disease. The largest effect was found in memory tests, highlighting that memory cognitive performances better discriminate than CSF measures.

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22 Neuropsychological Assessment in LATE - A Case-Report

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Objective: Limbic-predominant age-related TDP-43 encephalopathy (LATE) is a TDP-43 proteinopathy which occurs initially in amygdala, extending to limbic and neocortical brain regions. LATE is associated with cognitive impairment, usually an amnesic syndrome. Literature search didn't yield to any case report with follow-up and extensively medical and neuropsychological study. Hence, the present case is remarkable because of recent confirmed diagnose of mixed LATE, age at the

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onset of the symptoms and more than four years of follow-up in which exhaustive neuropsychological assessment and complementary test were conducted.
Participants and Methods: We describe a 75-year-old man with symptoms at initial onset of memory complaints of 1 year of evolution, normal computed tomography (CT) and normal neurological examination but with paroxysmal disconnection episodes. Patient underwent an exhaustive follow-up during 4 years: neuropsychological assessments in four different periods throughout the disease in order to examine verbal and non-verbal memory, language, attention, working memory, executive functions, praxis and gnosis. Moreover, complementary tests such as lumbar punctures, electroencephalogram, CT, structural magnetic resonance (MR), amyloid PET and finally an autopsy were conducted.
Results: At cognitive level, initial neuropsychological outcomes showed specifically mild deficits in verbal codification and poor long term memory without losing information regarding codification results with stability during 3 years. Since then, neuropsychological profile became progressively active with substantial decline in non-verbal memory with mild anomia and mild deficits in semantic fluency firstly. The last year showed a sever pattern of amnesia, aphasia, apraxia and agnosia. At the behavioural level, family reported symptoms of impulse control disorder (alcohol consumption) and dysregulation of thermal sensation and circadian rhythm. Multiple tests were performed with negative results for antibodies onco-neuronals, neuronal surface and RT-Quick and normal blood analysis. Biomarkers of Alzheimer disease (AD) were stable until the end of the process with positive results for amyloidosis but not significant for TAU and normal amyloid PET. MR revelled chronic hypoxic-ischemic leukoencephalopathy and diffuse cerebral atrophy. Final diagnose of mixed LATE was not confirmed until the autopsy post mortem that showed LATE neuropathological changes with presence of TDP-43 in medulla oblongata, hippocampus and amygdala, AD neuropathological change stadium V of Braak & Braak and amyloid angiopathy.
Conclusion: The patient shows a cognitive impairment initially specific for verbal codification with stability for 3 years but with rapid decline during last year. Characteristics of cognitive profile and evolution are atypical for typical AD, although mimicking AD at the end. Hence, this case suggests a thin specific differential pattern of deficits between LATE and AD which should be explored with empirical studies with more robust methodology. The importance of this case lies in the fact that LATE is an underdiagnosed and little-known neurodegenerative entity that is often confused because it shares pathogenic mechanisms with other types of dementia. However, although in this case neuropsychology is not diagnostic, it could help to differentiate earlier the cognitive profile of LATE in clinical practice.

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23 The Association of Stressful Life Events with Alzheimer's Disease Biomarkers and Brain Integrity

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Objective: Accumulated exposure to stressful life events was associated with several pathological pathways in people at risk for Alzheimer's disease (AD). Here we explored the association of specific stressful events, including death of relatives, major illnesses, adverse reproductive outcomes, economic and legal problems with AD pathophysiology and brain integrity in cognitively unimpaired participants at risk for cognitive decline.

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Participants and Methods: In this cross-sectional cohort study, 1137 participants completed a structured modified version of the Elder's Life Stress Inventory measuring the occurrence of 18 different stressful life events during the whole life-course. From those, 340 participants underwent a lumbar puncture and an [^{18}F]flutemetamol PET scan and 852 participants underwent structural magnetic resonance imaging. Cerebrospinal fluid [CSF] phosphorylated-tau (p-tau) was measured with Elecsys® immunoassays and amygdala and hippocampus volumes were obtained with FreeSurfer and Automated Segmentation of Hippocampus Subfields, respectively. We examined the association of the total occurrence of each individual stressful event with p-tau, beta-amyloid and total intracranial volume adjusted amygdala and hippocampus volumes by using multiple regression analyses adjusting for sex, age, years of education, history of cardiovascular disease and history of psychiatric disease.
Results: Participants' age ranged between 47−76 (mean [SD] age, 58.5 [7.1]) and 62.5% were women. Taken all stressors into account, participants reported 4,675 stressful events (1,844 those with biomarker data). Among the investigated life-course stressors, only a higher number of abortions was associated with an increase in p-tau levels (coefficient = 1.60, 99% CI = 0.01 to 3.19; p = .009) and a higher number of great economic losses with a lower amygdala volume (coefficient = −32.01, 99% CI = −58.84 to –5.17, p = .002), and hippocampus volume (coefficient = −65.49, 99% CI = −119.64 to −11.34, p = .002). Death of partner was also associated with an increase in p-tau levels (coefficient = 3.00, 99% CI = −0.31 to 6.32, p = .020) and divorce with a lower amygdala volume (coefficient = −21.93, 99% CI = −44.40 to 0.53, p = .012), but the evidence for these associations was less strong.
Conclusions: Our exploratory analyses suggest that specific stressors such as adverse reproductive outcomes and economic losses throughout life may have long-lasting effects on the brain and enhance pathological pathways. Future research is warranted to explore whether psychosocial stress, coping mechanisms or stress resiliency account for these associations. The results thus open avenues to explore interventions to promote stress resiliency after the occurrence of specific stressful life events in people at increased risk for cognitive decline.

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24 Impact of Fatigue and Anxiety but not Depression on Health-Related Quality of Life in Parkinson´s Disease

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Objective: Motor and non-motor symptoms are the main characteristics that influence the Health-Related Quality of Life (HRQoL) of Parkinson´s disease (PD) patients. This study aimed to investigate if anxiety, depression, apathy, fatigue, neurocognition and motor symptoms were significant predictors of HRQoL in PD. The second objective was to observe whether the predictive value of these variables was maintained after identifying and controlling for overlapping items between HRQoL and clinical measures. Finally, we analyzed if anxiety, depression, apathy, fatigue, neurocognition and motor symptoms were also a predictors of HRQoL dimensions.
Participants and Methods: One hundred and eight PD patients underwent an HRQoL and motor and non-motor symptoms' assessment. Overall HRQoL and its eight dimensions (mobility, activities of daily living (ADL), emotional well-being, stigma, social support, cognition, communication and bodily discomfort) were assessed by Parkinson´s Disease Questionnaire (PDQ-39). Motor symptoms were assessed by Unified Parkinson's Disease Rating Scale- part III (UPDRS III) and non-motor symptoms' assessment was comprised of an extensive neuropsychological evaluation (attention, working memory, verbal memory, visual memory, verbal fluency, executive functions, visuoconstructive abilities, cognitive flexibility and processing speed), anxiety, depression, fatigue and apathy measures.
The association between overall HRQoL (before/after overlapping items), HRQoL dimensions and demographic characteristics, cognitive reserve and LEDD was assessed by Spearman's rho correlation test. If a significant correlation was observed, these variables were added as covariates in the corresponding regression models. Analyses were corrected for multiple comparisons using Bonferroni correction to p< .004. According to the main

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objective, a correlation analysis was performed to analyze the association between overall HRQoL (before/after overlapping items), HRQoL dimensions and possible predictors (UPDRS III, neurocognition, anxiety, depression, fatigue and apathy). Bonferroni correction was readjusted to $p < .003$. For the analysis of predictors of overall HRQoL (before/after overlapping items) and HRQoL dimensions, stepwise multiple regression analyses were performed.
Results: Anxiety (β=.34; $p < .001$), fatigue (β=.27; p=.001) and depression (β=.18; p=.049) predicted overall HRQoL. After removing overlapping items, overall HRQoL was predicted by fatigue (β=.33; $p < .001$) and anxiety (β=.31; p=.001).
Regarding HRQoL dimensions, fatigue predicted mobility dimension (β=.45; $p < .001$) and bodily discomfort dimension (β=.21; p=.016). Anxiety predicted cognition dimension (β=.33; p=.001) and bodily discomfort dimension (β=.45; $p < .001$). UPDRS III predicted mobility dimension (β=.22; p=.006), ADL dimension (β=.32; p=.001) and communication dimension (β=.20; p=.037). Neurocognition predicted mobility dimension (β=-.22; p=.026).
Conclusions: The main results of this study showed that fatigue and anxiety are accurate predictors of overall HRQoL in PD. Therefore, these findings highlight the importance of identifying the overlapping elements between HRQoL and clinical measures, specifically depression, for an accurate interpretation of the results.

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25 An Individualized Program In A Patient With Logopenic Progressive Primary Aphasia During Covid-19 Pandemic

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Objective: We report a remote protocol of cognitive-linguistic management of logopenic variant of a Primary Progressive Aphasia (Lv-PPA) in a Moroccan bilingual Arabic and French-speaking patient. The implementation of a proactive intervention aims to anticipate neurocognitive and linguistic decline. Moreover, social restriction and lockdowns measures linked to the current pandemic maybe a potential psycho-social risk factor for this decline and which may interfere with the functioning of motivational reserve (Forstmeier et Maercker, 2008 ; Livingston et al, 2020).
Participants and Methods: We used a single-case design. Proactive management of PPA (Rogers et al, 2000) used 3 steps and focused on prediction, preparedness and anticipation. A modified version has been carried out in RB who is 78 years old, female, window, retired, right-handed with a bachelor degree. Neurological exam didn't show parkinsonian signs, oculomotor or posture disorders. MRI revealed a left parietal atrophy with normal volume of both hippocampi. The neuropsychological assessment showed an overall cognitive decline with dominant language impairment since 2015 (MoCa 20/30). Given that RB is still functional, we focused on the first stage targeting communication and coping strategies on a daily basis. Due to the context of the pandemic, telepractice sessions (2 to 3 per week) were provided from April 2020 until June 2020 via Skype and WhatsApp.
Results: The remote-based intervention included multiple culturally relevant components which helped the patient and her caregivers to identify needs and opportunities for social and distant interaction (family tree, social networks and family Album), introduce multimodal and prospective communication strategies (tablet and drawing) and develop a personalized communication and dairy book taking into account an active emotional insight.
Conclusions: The proactive linguistic management of PPA helped RB and her caregivers to maintain a level of functional and meaningful communication, regular social interaction, participation in different daily activities and boost her resilience despite this period of uncertainty. Generally, patients with PPA may be the best candidates for motivational support and counseling because of the initially preserved abilities in the episodic and autobiographical memory (Raman et al, 2020).

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26 Risk factors associated with Mild Cognitive Impairment. A Systematic Review and Meta-Analysis.

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Objective: Mild cognitive impairment (MCI) often represents a risk condition that may progress to dementia (DM). Currently, research has been conducted on possible risk factors specific to the progression from MCI to MD.

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However, different studies have reached different conclusions about the impact of certain risk factors. Therefore, a meta-analysis of risk factors predictive of cognitive impairment in individuals with MCI is needed. The aim of the following research is to identify the main specific risk factors that predict progression from MCI to MD.
Participants and Methods: Six electronic databases were searched for cohort studies published between March 2000 through April 20, 2021. Eligible studies were required to be considered of quality and provide sufficient data for analysis.
Results: Ten studies were considered for systematic review, of which seven were included in the meta-analysis. We found that the strongest positive associations among risk factors predicting progression from MCI to DM were: marital status (unmarried) (OR = 1.33, 95% CI = 1.19 to 1.47 I 2 = 0%, p = 0.57) and dyslipidemia (OR = 2.18, 95% CI = 1.40 to 3.39 I 2 = 30%, p = 0.23).
Conclusions: MCI patients who were without a partner or in a dyslipidemia-affected health condition have a high risk of progression to a DM state. The results could reflect the effects of a low level of social and intellectual stimulation that could be associated with maintaining a partner relationship and the care that may be involved. And on the other hand, they also reinforce the hypothesis of other research that an elevated blood cholesterol level could be related to an increased risk of DM, which could also be derived from the type of drugs used to control it. Both results invite us to develop intervention programs starting in young adulthood, offering psycho-social development factors and lifestyle changes that help to maintain healthy brain function. And in older adult populations, it will be necessary to reinforce psychoeducation for primary caregivers, family members and institutions, whose main focus is social, cognitive and functional stimulation, in order to reduce the risks of MCI or, failing that, of developing DM.

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27 The Facial Emotions Discrimination Test for the Assessment of Frontotemporal Dementia

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Objective: The Facial Emotions Discrimination Test (FEDT; divided into: Faces Test (FT) and Eyes and Mouths Test (EMT)) aimed to study the facial emotion recognition (FER) in the frontotemporal dementia spectrum (FTD).
Participants and Methods: Sixty-five subjects were included: 26 healthy controls (CTR), 25 presymptomatic (PreSIM) and 14 symptomatic (SIM) patients with sporadic or genetic FTD. The FEDT's performance between the three groups was compared and its relationship with neuropsychological tests (NPS), behavioural and functional scales/questionnaires (Revised Cambridge Behavioral Inventory (CBI-R) and Frontotemporal Dementia Rating Scale (FTD-FRS)), and levels of different biomarkers in cerebrospinal fluid were studied.
Results: The FEDT did not show significant differences between CTR and PreSIM (FT: $t(49) = -1.106$, $p = 0.274$; EMT: $t(49) = -0.030$, $p = 0.976$), but it did between CTR and SIM (FT: $t(14) = 3.866$, $p < 0.05$; EMT: $t(14) = 3.892$, $p < 0.05$) and PreSIM and SIM (FT: $t(14) = 4.173$, $p < 0.05$; EMT: $t(14) = 3.895$, $p < 0.05$). The Ekman Test showed similar results amongst the three groups. The FEDT correlated with the Ekman Test, most of the NPS tests, the CBI-R and the FTD-FRS, and neurofilament light (NfL) levels in the total sample. Unlike the Ekman Test, the FEDT-FT correlated with the FTD-FRS ($r = -0.478$, $p < 0.05$) in cognitively healthy subjects. The TDEF-FT and the Ekman Test have an appropriate capacity to discriminate SIM from CTR and PreSIM ($p < 0.001$; S = 79%, E > 77%).
Conclusions: The FEDT-FT and the Ekman Test have a similar performance, but the FEDT-

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FT is shorter, more ecological and includes faces from Spanish population. Since behavioural changes in presymptomatic phases are subtle and progressive, the FEDT is not able to identify PreSIM subjects. Nevertheless, the FEDT allows to identify patients with DFT and assess FER in this population.

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28 Graph analysis of verbal fluency test discriminate between presymptomatic FTD and normal controls

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Objective: This study aims at analyzing semantic verbal fluency data of presymptomatic progranulin (GRN) mutation carriers at risk for frontotemporal dementia and compare with a control group using a Graph Theory analysis.
Participants and Methods: a total of 24 participants (14 presymptomatic cariers and 10 controls) took part of this study. All participants were part of the GENFI project. They were matched by age and SSEE. Both groups of participants went through a comprehensive neuropsychological assessment that included the Mini Mental State Exam (MMSE), Digit Span, The Free Cued Selective Reminding Test, Boston Naming Test, Trial Making Test, and the Stroop Color and Word test. Data from the Semantic Verbal Fluency (animal category) were recorded, including repetitions and errors. The scoring procedure of this task included 13 graph parameters generated by the Speech Graph software (Mota et al., 2014). The program presents a text as a graph, representing every word as a node, and the temporal link between words as an edge. Non-parametric Mann–Whitney–Wilcoxon test was used to compare performance in both groups.
Results: No significant differences between the groups were found in the neuropsychological assessment, indicating that both groups were cognitively healthy. However significant differences in the graph attributes of both groups were detected. Presymptomatic GRN carriers presented fewer words than control as showed by the word count attribute (U= 35.5; p = 0.04), total of nodes (U= 31.5; p = 0.02) and edges (U= 35.5; p = 0.04). Also, global attributes of the graph showed that presymptomatic carriers had a less density network (U= 110; p = 0.02) compared to normal controls.
Conclusions: These findings provide support for a new methodological approach to assess the strength of semantic memory, and therefore, the semantic network, through the verbal fluency task and the use of graph analysis approach.

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29 Is the cognitive profile of SARS-CoV infectious cases no confirmed diferent from confirmed case?

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Objective: to study cognitive profile of patients with probable or possible SARS-CoV and compare it with cognitive profile of patients with evidence of SARS-CoV.
Participants and Methods: 54 consecutive patients infected dyring the first wave of the Cov-19 (from 15 on March until 7 of juny) with subjective cognitive complains were evaluated with a comprensive neuropsychological battery. 36 patients patients infected had evidence of SARS-CoV-19 (age 52,36± 12,44; cultural level: 14,77±2,97) and 18 without microbiological confirmation (probable or possible CoVID)(age 46,89± 12,73 cultural level: 14,11±3,23). Cases were defined as probable COVID-19 if a chest radiograph or chest CT was consistent with COVID-19 but PCR and serology were negative or not done.

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Cases were defined as possible COVID-19 if the disease was suspected on clinical grounds by the notifying clinician but PCR, serology, and chest imaging were negative or not done.
Individual raw scores from individual test were transformed into T scores and grouping them in a composite factors of attention (CPT-II), memory (RAVLT and Recall ROCFT), language (BNT and fonetica and semantic fluency), executive function (Coding and Symbol search WAIS) and processing speed (TMT-A, TMT-B and Stroop color and inhibition) were created. Global cognitive performance were evaluated with MoCA-T. Differences between age, cultural level, cognitive performance were analyzed with an ANOVA and descriptive stadistics.
Results: The group of patients infected without microbiological confirmation were younger than the group with The median scores no showed statistically significant differences between groups in age, cultural level, global cognitive performance and attention, memory, language, executive functions and processing function.
Conclusions: The results show that many people with symptoms compatible with the infection that could not confirm their infection microbiologically due to lack of resources, and some people who did so later did not show antibodies, have a similar cognitive deficits and therefore they should be studied and included in neurospichological studies.

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30 White matter abnormalities in COVID-19 patients with persistent hyposmia

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Objective: Neurologic symptoms have been reported in patients with COVID-19, but available neuroimaging data is still limited. The aim of this research is to study white matter (WM) abnormalities in patients with persistent olfactory dysfunctions.
Participants and Methods: Forty-seven COVID-19 patients were (interval between the infection and the assessment in months, xÌ□= 10.1; SD=3.9) evaluated using diffusion-weighted (DTI) on a 3T scanner. Whole-brain voxelwise statistical analysis of the fractional anisotropy (FA) and mean diffusivity (MD) data was carried out using Tract-Based Spatial Statistics[1](TBSS) and FSL's randomise[2]. The Smell Identification Test (UPSIT)[3]was used to measure olfactory function at the time of neuroimaging. Correlations between DTI measures and the UPSIT were computed.
Results: Twenty-five patients were classified as normal or mild hyposmia and twenty-two as severe hyposmia or anosmia according to the UPSIT cut-off scores. Groups did not differ in age, years of education and sex. Patients with olfactory dysfunctions showed higher MD values in the genu of the corpus callosum, orbitofrontal WM tracts, the anterior thalamic radiation and the forceps minor compared to those with normal olfactory function (p=0.05). FA values were positively correlated with smell performance in the anterior thalamic radiation, the fornix, the forceps minor, and the corpus callosum (p=0.02), whereas MD values were negatively associated with this measure in orbitofrontal WM tracts (p=0.04).
Conclusions: There is persistent decreased WM integrity explaining olfactory deficits in COVID-19 patients.
Funding: The study was partially supported by a research agreement with Sage therapeutics. AC, JO, CJ, RSL and BS were supported by the PANDÈMIES 2020 program of the Agència de Gestió D'Ajuts Universitaris I de Recerca (AGAUR) (2020PANDE00053).
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31 Long-COVID and declarative memory

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Objective: Although COVID-19 patients present primarily with symptoms of respiratory disease, SARS-CoV-2 induced impairment of multiple organ functions, and it is common the presence of neurological symptoms. Weeks or months after acute COVID-19, around 10-20% of infected with SARS-CoV2 experience various symptoms, including cognitive impairment. Mainly, impairments in memory, executive function, and language are present in up to 70% of people with the post-COVID syndrome (PCS). Our objective was to explore declarative memory in a sample of individuals affected by PCS and to compare it with a sample of healthy controls.
Participants and Methods: Preliminary data from the Nautilus Project were analyzed. The sample consist of 196 participants (N=118; 60.20% female) with PCS (according to NICE) recruited from Neuropsychology and COVID Units from 17 Hospitals from Catalonia, Madrid, Galicia and Andorra (mean age=48.06, SD= 9.11; mean years of education= 13.57, SD= 3.13; mean days from acute disease= 310.85, SD= 127.58) and 52 healthy control participants (N=37; 71% female) selected from non-healthcare community settings (mean age=46.63, SD= 9.72; mean years of education= 15.10, SD= 3.08). Declarative memory was assessed by Rey Auditory Verbal Learning Test (RAVLT) (first attempt, delayed recall and recognition); The Rey–Osterrieth Complex Figure (ROCF) (immediate recall, delayed recall, and recognition) and semantic fluency (animals). We used the direct score from the Vocabulary subtest of the WAIS-IV to measure premorbid intelligence. The alpha level was set at p=0.05. Statistical analyses were performed in IBM SPSS Statistics 27.
Results: The groups were equivalent in age and sex, but not in years of education and the Vocabulary subtest. Thus, we adjusted for vocabulary and years of education. PSC group performed significantly worse in RAVLT-1st attempt (mean difference= -3.88, p= 0.009), RAVLT- delayed memory (mean difference= -5.16, p=0.003) and Semantic fluency (mean difference= -1.56, p=0.001).
Conclusion: From our results, it can be deduced that the group of participants with PCS presents an alteration of episodic and semantic memory about a year after passing the disease. Additional analyzes of the project data are needed to elucidate more factors involved in the impaired memory of PCS.

32 Post-COVID syndrome and fibromyalgia, is cognition what they have in common?

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Objective: The prevalence of post-COVID-19 syndrome (PCS) is unclear, but it is estimated that around 10-20% of people have persistent symptoms for weeks or months after initial SARS-CoV-2 infection. Clinical features of

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fibromyalgia (FM) are common in patients who recovered from COVID-19. Musculoskeletal pain, a cardinal symptom of FM, is frequently reported, along with fatigue, neuropsychiatric disturbances, and executive dysfunction. Our objective was to compare a sample of PCS patients with an FM sample on the performance of several measures of executive functioning.
Participants and Methods: The sample consisted of 91 women with PCS (according to NICE) recruited from Neuropsychology and COVID Units from 17 Hospitals from Catalonia, Madrid, Galicia and Andorra (mean age=43.36, SD= 8.77; mean years of education= 13.80, SD= 3.04; mean days from acute disease= 318.84, SD= 126.55), 110 women diagnosed with fibromyalgia (according to of the American College of Rheumatology) recruited from the Fibromyalgia Unit of the Hospital Santa Maria of Lleida (mean age=45.37, SD= 5.56; mean years of education= 10.46 SD= 8.77), and 79 healthy control (HC) women selected from non-healthcare community settings (mean age=44.82, SD= 7.77; mean years of education= 12.56, SD= 3.56). We measured various components of executive functions and attention: phonological fluency (spontaneous production of words beginning with the letters P, M and R within a time limit of 60 seconds for each letter), Digits span forward of the WAIS-III scale, Trail Making Test and Stroop Color and Word Test (inhibitory control task). We used the direct score from the Vocabulary subtest of the WAIS-III scale to measure premorbid intelligence. The alpha level was set at p=0.05. Statistical analyses were performed in IBM SPSS Statistics 27.
Results: The groups were equivalent in age, but not in years of education and the Vocabulary subtest. Thus, analyses were made adjusting for vocabulary and years of education. PCS (mean difference= 5.99; p= 0.001) and FM (mean difference= -6.83; p< 0.001) performed worse than the Control group in Stroop Test (inhibitory control task). On the other hand, FM group performed worse than the Control (mean difference= -0.571; p= 0.007) and the PCS (mean difference= -0.82; p< 0.001) groups in Digits span forward.
Conclusions: Interference inhibition is a shared executive dysfunction in PCS and FM. Moreover, the FM group perform worse than the HC group on measures of auditive-verbal attention. Further analyses are needed to elucidate the mechanisms involved in these results.

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33 Long-term impact of the COVID-19 on cognition: what is the role of the disease severity?

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Objective: COVID-19, the disease caused by the SARS-Co2 virus, affects multiple organs, including the central nervous system (CNS). Some of those effects will resolve themselves, but others may be long-term and even chronic. It seems logical to think that patients with severe forms of COVID-19 will have more chronicity. Admission to the intensive care unit (ICU) produces sequelae in patients due to the disease itself and the bed and treatment and affects cognition up to 5 years after discharge. However, available data show that not only critically ill patients who have suffered COVID-19 present sequelae or persistent symptoms. The post-COVID syndrome (PCS) is common in young patients with good health and physical condition before infection. Existing data on the incidence and course of post-COVID cognitive impairment are heterogeneous because the studies used samples that mix patients of varying severity (critical and moderate to mild forms of COVID). We aimed to determine if there are differences in cognitive impairment concerning the severity of COVID-19. To do this, we analyze preliminary data from the Nautilus Project.

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Participants and Methods: The sample consists of 214 participants with PCS (according to NICE) recruited from Neuropsychology and COVID Units from 17 Hospitals from Catalonia, Madrid, Galicia and Andorra. The participants were classified in three groups according to the severity of the COVID-19: critically ill (ICU) (N=65, female= 38%, mean age= 53.03, SD= 8.90; mean years of education= 12.78, SD=3.15), hospitalized without ICU (N=50, female= 42%, mean age= 52.63, SD= 9.38; mean years of education= 12.86, SD=3.69), and mild (have had the disease at home) (N=99, female= 79%, mean age= 45.84, SD= 10.08; mean years of education= 13.71, SD=3.13). We performed a comprehensive neuropsychological evaluation, including attention and working memory, episodic memory, executive function and social cognition. We used the direct score from the Vocabulary subtest of the WAIS-IV to measure premorbid intelligence. The alpha level was set at p=0.05. Statistical analyses were performed in IBM SPSS Statistics 27.
Results: As expected, age and sex differed between the groups, with a higher frequency of older men in the ICU group, but so did educational level and Vocabulary score. Analyses were adjusted for age, sex, years of education and Vocabulary. We found no significant differences in any domains studied except social cognition. ICU group performed worse in Reading The Mind in the Eyes Test (mean difference= -6.00, p=0,031) than the mild group.
Conclusion: As described in the literature, the cognitive impairment of the PSC does not seem to be related to the severity of COVID-19. However, our results show that the affectation of social cognition is associated with the greater severity of the disease. Additional analyzes of the project data are needed to elucidate more factors involved in the impaired social cognition of PCS.

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34 Cognitive and Affective Deficits in Covid-19 Patients. A Longitudinal Follow up.

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Objective: To analyse the COVID-19 cognitive and psychopathological sequelae as well as their evolution over a year after infection; and to explore neurological and clinical factor to development of cognitive difficulties in patients infected by the Sars-Cov-2 virus.
Participants and Methods: Prospective study with a 41 patients with COVID-19 who required admission to the Hospital Universitari Parc Taulí in Sabadell between 3 April and 24 May 2020. The following exclusion criteria were applied: a) > 65 years old; b) being admitted to the Intensive Care Unit; and c) previous neurological and/or psychiatric disease. Patients were prospectively followed up during their admission and a neurological and neuropsychological examination was performed after 3 and 12 months from their hospital discharge. Curb-65, ferritine, D-dimer, sat O2, and neurological variables (anosmia, myalgia, cefalgia, tremor etc.) were collected. The neuropsychological examination consisted of a battery of tests, which allow us to established five cognitive domains (attention, working memory, learning and retrieval, executive functions and processing speed). Anxiety and depressive symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS). Descriptive statistics and logistic regression models were used respectively to identify cognitive and affective deficits, and to explore the influence of the potential neurological and clinical factors related with.
Results: From 205 patients admitted, 62 patients met the inclusion and exclusion criteria. The final analysis was performed in 41 patients. At 3 months after hospital discharge, 22.6% of patients had impaired attention; 19.4% showed impaired working memory; 16.1% had impaired learning and retrieval; 9.7% had impaired

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executive functions and 8.2% had impaired processing speed. At 12 months after the hospital discharge, the 14.3% of patients still showed impaired attention; 2.4% impaired working memory; 2.5% impaired executive functions, and 2.5% impaired processing speed. None of the patients had impaired learning and retrieval (Fig. 1). In addition, 12.6% of patients showed anxiety 3 months after hospital discharge and 5.8% were still anxious one year after. 8.9% and 2.8% of the sample had depressive symptoms at 3 and 12 months respectively. one (Fig. 2). Presence of anosmia (OR=5.87; 95%CI 5.05-6.70; p=0.032;) and myalgia (OR=9.37; 95%CI 8.29-10.45 p=0.039) were statistically related to working memory impairment at 3 months. Anxiety, depression, and all other clinical records were not statistically related to cognitive deficits.

Conclusion: These findings show that cognitive sequelae are present in hospitalized non-critically patients with COVID-19 illness. Cognitive deficits are independent of anxiety and/or depression symptomatology. None of the clinical variables were related with the cognitive alterations/problems/difficulties except for anosmia and myalgia, which could predict the presence of working memory impairment. Despite the cognitive improvement observed, some patients still have cognitive deficits even one year after hospital discharge. Future studies should clarify the extent to which cognitive abilities and anxious-depressive symptoms are improved over time, as well as determine which other variables may be related to a higher risk of developing these sequelae.

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35 Neurocognitive and Psychiatric Performance in People with Recent HIV/AIDS Diagnosis

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Objective: Depression has been extensively studied as a cause of cognitive deficit in the general population. In people living with HIV/AIDS, depression is almost three times more common than in the general population (Bing et al., 2001, Orlando et al., 2002, Cook et al., 2018, Do et al, 2014). On the other hand, HIV/SIDA is associated with mild cognitive impairment (asymptomatic or with an effect on functionality) and, in its later stages, with HIV/AIDS-related dementia (Antinori et al. 2007). Few studies have examined the relationship between psychiatric symptoms and cognitive decline in HIV/AIDS, but most have focused on later stages of the infection. Because of that, we ignore the role depression and anxiety might play in cognitive deficits in HIV/AIDS patients. Studies centered on the early stages of the infection might reveal information about this interaction. This paper aims to assess cognitive performance and psychiatric morbility (depression and anxiety) in a sample of people living with HIV/AIDS.

Participants and Methods: A sample of 72 male patients with recent HIV diagnoses (less than six months) from La Clinica Especializada San Fernando – ISSSTE were assessed with the Hospital Depression and Anxiety Scale (HADS) (Snaith, 2003) and the Montreal Cognitive Assessment (MoCA) (Nasreddine, 2004) Spanish version of (Ledesma, 2014).

Results: On the depression scale, 86.1% of the patients scored as normal, 9.7% with suspected depression, and 4.2% with confirmed depression symptoms. On the anxiety scale, 59.7% scored average, 22.2% with suspected anxiety, and 18.2% with confirmed anxiety. In the MoCA, 62.5% performed as normal. Meanwhile, 37.5% showed cognitive impairment. In the statistical analysis, depression and anxiety show a positive correlation ($r=.645$, $p< .001$), but no correlation between cognitive performance and psychiatric symptoms was found.

Conclusions: Depression and cognitive impairment had been extensively linked in both the general population and HIV/AIDS patients; nevertheless, our results showed contrary results. This could be explained because of these reasons: 1) Since our sample is composed of people with a recent diagnosis, depression might not be severe enough to affect cognition (Sarapas et al., 2012), follow-up studies where neurocognition and psychiatric symptoms are tested periodically could give insight into this line of work. 2) There has been a suggestion that people with seropositive status can develop a particular depressive syndrome result of chronic inflammation caused by the infection. This syndrome is characterized by severe or moderate somatic symptoms: fatigue as the prominent feature, poor appetite or overeating, and sleep disturbance. Follow-up studies where inflammation biomarkers are tested will show if this is the reason (Norcini et al., 2017). 3)Although many studies in HIV/AIDS

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population have been used MoCA as a cognition measure, some studies have also recommended to use extensive batteries to diagnose HIV/AIDS-associated cognitive impairment (Janssen et al., 2015). For this reason, it is necessary to develop tests focused on this population and the inclusion of preventive intervention strategies or cognitive maintenance in the treatments they receive.

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36 Clinical Predictors Leading to Neuropsychological Impairment Following COVID-19 Infection

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Objective: To describe the cognitive profile and clinical predictors leading to neuropsychological impairment in subjects following COVID-19 infection.
Participants and Methods: A single-center cohort study that included all consecutive adult inpatients between 20 and 60 years old with confirmed COVID-19. Neuropsychological assessments were performed by the same-trained neuropsychologist beginning April 22nd to June 16th, 2020. Patients with previous cognitive impairment and any other central nervous system or psychiatric affection were excluded. Demographic, clinical, and laboratory data were extracted from medical records.
Results: Thirty-five patients met inclusion criteria and were included in the study. Patients presenting headache, anosmia, dysgeusia, diarrhea and those who required oxygen therapy had lower scores in memory, attention and executive function subtests compared to asymptomatic patients. Patients with headache and hypoxia (established by requirement of oxygen supply) scored lower in the global Cognitive Index (P = 0.002, P = 0.010). A T score lower than 30 was found in memory domains, attention and semantic fluency (2 [5.7%]) in working memory and mental flexibility (3 [8.6%]) and in phonetic fluency (4 [11.4%]). Higher scores in anxiety and depression (P = 0.047, P = 0.008) were found in patients with cognitive complains.
Conclusions: Neurologic manifestations in COVID-19 patients are frequent and cognitive impairment could be one of them. Neurological symptoms during infection, diarrhea and oxygen therapy are risk factors for cognitive deficit. Cognitive complains are associated with anxiety and depressive symptoms.

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37 Objective and Subjective Cognitive Deficit in COVID-19 Critically Ill Survivors One Year After ICU Discharge

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Objectives: Intensive Care Unit (ICU) COVID-19 survivors may present long-term cognitive and emotional difficulties after hospital discharge. During the pandemic, the implementation of telematic monitoring has proliferated. However, the ability to detect cognitive deficits using subjective deficit perception measures needs to be studied. 1) To characterize the neuropsychological profile, emotional state and perception of cognitive deficit in survivors of critical illness due to COVID-19, 12 months after ICU discharge, 2) to study whether the use of a measure of perceived cognitive deficit allows the detection of objective cognitive impairment and 3) to explore the relationship between demographic,

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clinical and emotional factors with both objective/subjective cognitive deficits.
Participants and Methods: Observational, transversal study in adult survivors of critical illness due to COVID-19 recruited from two medical ICUs. Exclusion criteria: dementia, prior cognitive impairment, severe psychiatric disorder, neurological disease and intellectual disability. Perception of cognitive dysfunction was evaluated 12 months after ICU discharge with the Perceived Deficits Questionnaire (PDQ-20) with a cut-off point of >34. At the same time, a comprehensive neuropsychological assessment was administered. Seven cognitive indexes (z-scores) were calculated: attention, working memory, verbal learning, verbal memory storage, memory retrieval, speed of processing and executive function (EEFF). Emotional state was screened by two self-rating questionnaires: Hospital Anxiety and Depression Scale and Davidson Trauma Scale. Clinical data and cognitive reserve were collected retrospectively. Prevalence of objective cognitive deficits was calculated using the criteria of Jackson et al. (PMID:20299535). Mann-Whitney U and Chi-square tests were used to explore differences between subjects with and without objective/subjective cognitive deficit. Logistic regression models were used to identify factors related to both cognitive deficits.
Results: The sample consisted of 79 patients (68.4% male) with a median age of 60.5 (Min:33.15-Max:79.64) years. 62% received invasive mechanical ventilation with a median duration of 16 days (2-67). Objective cognitive impairment was observed in 30.4% (N=24) of COVID-19 survivors. Worst performance was detected in EEFF (Median:-0.8; Min:-4.41-Max:1.74), speed of processing (-0.49; -7.64-1.41), and memory retrieval (0.21; -4.42-1.48). A 27.8% of patients subjectively perceived cognitive dysfunction, a 22.8% suffered from mild-to-severe anxiety, a 26.6% from mild-to-severe depression and a 27.8% from post-traumatic stress disorder (PTSD) symptoms. No significant differences were found in perception of cognitive deficit between patients with and without objective cognitive impairment (χ^2=3.059;p=0.080). Gender (OR=7.524; 95%CI:1.25-45.37; p=0.028), and PTSD symptomatology (OR=1.104; 95%CI:1.03-1.19; p=0.006) resulted potential predictors of perception of cognitive deficit. Cognitive reserve was inversely related with objective cognitive impairment (OR=0.868; 95%CI:0.77-0.98; p=0.023).
Conclusions: One third of COVID-19 patients had objective cognitive impairment 12 months after ICU discharge. The neuropsychological profile was frontal-subcortical. Almost one third of patients perceived cognitive dysfunction and 23-28% showed emotional difficulties. No differences were found in perception of cognitive deficit between patients with and without objective cognitive deficit. Emotional state was strongly related to perception of cognitive deficit but not to objective cognitive impairment. Specifically, being a woman and suffering from PTSD symptoms emerged as predictive factors for perceiving worse cognitive performance. Cognitive reserve appears to play an important role in protecting objective cognitive functioning.

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38 Effects of Diagnosis Threat on Cognitive Complaints After COVID-19 Infection: Validation Study

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Objective: The term “long-COVID” describes the reporting of enduring neurological symptoms after being ill with COVID-19 (e.g., headaches, fatigue, and attentional impairment). Providing information about long-COVID increased subjective neurological complaints among recovered COVID-19 patients compared to exposure to neutral information (Winter & Braw, 2022). Furthermore, this effect was particularly notable among suggestible participants. Our aim in the current study was to validate these initial findings, while assessing the impact of additional variables (e.g., being vaccinated against COVID-19).
Participants and Methods: Recovered patients (n = 270) and healthy controls (n = 290) reported cognitive failures after being randomly assigned to either a diagnosis threat (exposure to an article providing information regarding the long-COVID) or control condition.
Results: Recovered patients, but not healthy controls, reported more cognitive failures in the diagnosis threat condition compared to the control condition.
Furthermore, this effect was larger among unvaccinated participants than those that were vaccinated. Suggestibility was significantly correlated with endorsement of cognitive failures.
Conclusions: Diagnosis threat may contribute to the persistence of cognitive complaints among recovered COVID-19 patients.

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Suggestibility may be an underlying mechanism that increases perceived threat, while being vaccinated seems to be a protective factor. These may be the focus of future research and perhaps aid in identifying risk factors for endorsing COVID-19 symptoms past the resolution of its acute phase.
References: Winter, D., & Braw, Y. (2022). COVID-19: Impact of diagnosis threat and suggestibility on subjective cognitive complaints. *International Journal of Clinical and Health Psychology*, *22*(1), 100253.

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39 Perception of the neuropsychological impact of COVID-19

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Objective: Measure de perception of neuropsychological impact of COVID-19 on the argentine adult population
Participants and Methods: Descriptive study with a sample of 475 participants recruited from argentine adult population
Results: It had been reported decreased working memory, brain fog, loss concentration, anxiety and mood disorder
Conclusions: All the results will be presented at the congress.

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40 Do Facial Expressions Yield Context-Dependent Effect in Times of COVID-19?

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Objective: Recent research indicates that correct recognition of unfamiliar faces is reduced in times of a pandemic such as Covid-19, when wearing face masks is mandatory in most countries around the world. An established finding is that face recognition is highly influenced by the context in which the face has been studied, commonly termed as context dependent effect (CDE). Facial expressions also have been found to serve as a context in facial recognition. We therefore studied among young adults, whether facial expressions could yield CDE even when part of the face is covered. In addition, we evaluated how masks affect the correct identification of emotions.
Participants and Methods: Ninety-eight young adult participants performed a face recognition and an emotion detection task. The participants were randomly allocated to either the "with masks" or "without masks" groups. In the "with masks" group, facial stimuli were covered with a mask. In the face recognition task, participants studied 42 faces with neutral expressions. Then at the test phase, they were presented with 84 stimuli of faces, half of which had been viewed during the study phase. One-third of the old and new faces displayed neutral facial expressions, one-third angry and one-third happy facial expressions. In the emotion-detection task participants were asked to decide which of the three emotions (neutral, angry, happy) the presented face expressed.
Results: Both young adult groups showed a similar Hits rate performance, and expressed CDE (neutral > angry > happy). The "with masks" group had a higher overall rate of False Alarms, significantly higher for neutral compared to happy faces. The "without masks" group had a lower false alarm rate of happy faces compared to neutral and angry faces. Higher overall sensitivity (*d'*) was found for the "without masks" group, with highest sensitivity for neutral and lowest for angry faces. In the "with masks" group sensitivity was also highest for neutral faces, but lowest for happy faces. Response bias (C) was overall more liberal in the "with masks" group, and most liberal in the neutral condition. In the group "without masks" only response bias was conservative for happy faces. Masks reduced overall correct emotion identification, but only happy emotion was significantly less well identified.
Conclusions: Our study indicates that even when the face is covered, CDE of facial expressions in face recognition does emerge in young adults. However, face masks seem to increase False Alarms rate and influence sensitivity and response bias. Furthermore, face masks reduced the correct identification of happy emotion.

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41 Out of the box: Cognition in autoimmune encephalitis does not conform to a common pattern

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Objective: Autoimmune Encephalitis (AE) is a neuro-inflammatory illness targeting the central nervous system, with presence of neurological, cognitive, and psychiatric symptoms. Cognitive dysfunction is a commonly noted outcome of this disease, but is not well described in the literature. Our primary aim was to characterise psychometric outcomes in this population. Secondarily, we examined predictors of psychometric outcomes.
Participants and Methods: This retrospective observational study collected cognitive psychometric data from 59 AE patients across six secondary and tertiary hospitals in Victoria, Australia. Further data including patient general demographics, antibody profile, clinical features, paraclincal findings and hospital stay data was obtained. Psychometric data was standardised into age and education normative values, and categorised according to the principle cognitive domain. Pattern analysis was employed to characterise psychometric patterns,and determine frequency of these patterns. Univariable logistic regression was performed to examine predictors of 'intact' and 'pathological' psychometric outcomes.
Results: Deficits in psychometric markers of executive dysfunction were the most commonly observed in this cohort, followed by deficits on tasks sensitive to memory. Half the cohort were classified as having psychometric impairments across at least two cognitive domains. Of the 64 possible psychometric patterns that could emerge from the data, 29 were observed. The four most frequent psychometric patterns observed in the AE cohort included; 1) Preservation of all cognitive domains, which comprised of fifteen patients (25.42%); 2) isolated psychometric deficits in tasks of memory, comprising five patients (8.47%); 3) dysexecutive features and deficits in memory comprised of four patients (6.78%) and 4) isolated psychometric deficits on tasks of visuospatial/visuoconstruction (5.08%). None of the demographic data, clinical features, and auxiliary examination variables were predictors of psychometric outcome.
Conclusions: Psychometric outcomes of AE are complex. We identified that significantly reduced psychometric markers of executive function and memory were most frequently observed in our cohort. Further, half of the cohort were classified as having psychometric impairments across at least two cognitive domains, conveying that deficits in psychometric markers are not uncommon in this population. There is significant variability in psychometric outcomes, with 29 patterns of outcome observed. Notably, none of the variables explored were predictors of psychometric outcomes. To improve clinical practice consideration should be made to ongoing comprehensive cognitive monitoring, and reactive intervention when required. This performed at the individual level will assist in managing the long-term morbidity of this disease, to minimise the effect on the individual's quality of life and deleterious psychological outcomes.

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42 Autoimmune Encephalitis: A Multi-Modal Cognitive Disorder

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Objectives: Autoimmune encephalitides (AE) are rare and diverse neurological conditions, which are characterised by an immune-mediated inflammation of the brain. While individuals afflicted with this disease, and their carers, subjectively report cognitive dysfunction, objective explorations of the neuropsychology syndromes in the clinical literature are limited. This limited literature impedes clinical management of a common comorbidity, including our understanding of the neuropsychological syndromes and which clinical variables may affect outcomes. Here, we conducted a comprehensive neuropsychological

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assessment on a prospective cohort of AE patients to characterise long-term cognitive outcomes and evaluate the association of clinical, paraclinical, and markers of neuronal injury to these outcomes.
Participants and Methods: Standardised neuropsychological assessments were performed prospectively in a series of 50 patients with AE. Patients were recruited from four secondary and tertiary referral centers in metropolitan hospitals in Victoria, Australia. Data was standardised into age and education normative values. Wechsler indices scores from the WASI-II, WAIS-IV, and WMS-IV were derived for each patient and include the Verbal Comprehension Index, Perceptual Reasoning Index, Working Memory Index, Processing Speed Index, Immediate Memory Index, Delayed memory Index, Auditory Memory Index, and Visual Memory Index. Descriptive statistical analyses of general demographics, clinical features, auxiliary examinations, and psychometric variables were performed using summary statistics. Clinical and paraclinical variables, and markers of neuroaxonal injury, were evaluated for their association with cognitive outcomes.
Results: Average disease duration was 4.1 years. Of the 50 patients, 32% of patients had ongoing cognitive syndromes, with 18% of patients classified with moderate impairments, and 14% with severe cognitive impairment. Deficits on tasks sensitivity to memory were the most commonly observed in this cohort, however significant variability in cognitive outcomes was observed. Of the seropositive group, those with anti LGI1 antibody-mediated AE had worse overall cognitive outcomes compared to other AE sub-types. Serum neurofilament light levels were associated with cognitive outcomes (p=0.001).
Conclusions: Patients with AE can exhibit complex cognitive deficits years after the initial diagnosis. This study has elucidated the complex cognitive outcomes in AE, that are independent of many clinical and paraclinical variables. Of interest, the association of serum neurofilament light levels to cognitive outcomes suggests that there is ongoing neuronal axonal injury, perhaps indicating there is a level of ongoing neuroinflammation driving poorer cognitive outcomes. Further research is required to characterise the wide array of clinical neuropsychological outcomes, and investigate causal mechanisms if we are to improve our ability to predict cognitive outcomes in this population.

43 Neuropsychological Effects of Early Life Stressful Events in Recently Diagnosed Men with HIV Infection

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Objective: Both HIV infection and stressful adverse experiences in childhood have been related to increased risk of cognitive impairment, emotional disorders, and functional impairment, independently. Regarding HIV infection specifically, there is a significant lack of studies examining the combined effect between HIV and early life stress (ELS) in recently diagnosed men with HIV infection (MWH). We decided to carry out an investigation to clarify this aspect, hypothesizing that MWH and high levels of ELS may be more vulnerable to neurocognitive, emotional, or functional impairment.
Participants and Methods: We conducted a cross-sectional study aimed to explore the combined effects between HIV and ELS in cognitive performance, emotional status, and daily functioning. Participants were recently diagnosed MWH (n=27) and a control group comprised by seronegative individuals matched for age, sex, and educational level (n=15). All individuals underwent a comprehensive neuropsychological assessment that covered 6 cognitive domains (2 measures per domain): attention and working memory, processing speed, fine-motor dexterity, learning and verbal memory, verbal fluency, and executive functioning. Emotional status (depression, anxiety, and perceived stress) and daily living functioning (total areas impaired) were also

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explored. Early Trauma Inventory – Short Form was used to evaluate ELS before the age of 18, with a cutoff of 4. Standardized *z* scores were compared across groups using Chi-Square and independent *t* tests. Effect sizes were also calculated using Cohen's *d*.
Results: Differences in cognitive performance were not detected in any domain between recently diagnosed MWH and seronegative individuals (all *p* values >0.05). MWH presented more anxiety (p=0.033) and depression (p=0.014) symptoms, and stress (p=0.020) than men without HIV. A total of 44% of MWH had experimented ELS events compared to 20% in the control group (p=0.105). According to history of ELS, a lower performance was revealed in tasks evaluating working memory (p=0.004, d=-0.94), fine-motor dexterity (p=0.004, d=-1.72), learning (p=0.034, d=-0.82), and executive function (p=0.045 d=-0.85) in MWH with ELS compared to those without ELS. Differences in emotion or daily functioning were not found in MWH with ELS compared to MWH without ELS. Discrepancies in cognitive performance were not detected between seronegative controls according to presence of ELS. Nevertheless, participants without HIV with ELS reported more anxiety symptoms (p=0.022, d=1.76), stress (p=0.029, d=2.23), and worse daily living (p=0.016, d=-2.23) than those without ELS. When MWH without ELS were compared to seronegative individuals without ELS, they presented more anxiety (p=0.022, d=1.17) and depression (p=0.080, d=0.90) symptoms, and perceived stress (p=0.021, d=1.85).
Conclusions: The results of this investigation show that men recently diagnosed with HIV infection and childhood stressful adversities are more vulnerable to cognitive dysfunction and this may have a role in HIV-associated neurocognitive disorders. Regarding emotional and daily functioning, we did not find differences, although this effect could be explained by the high emotional impact right after the diagnosis. Therefore, the assessment of childhood stressful adversities should be included in both clinical and research assessment protocols for people with HIV when addressing brain health outcomes.

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44 Cognitive Functioning of Children HIV-Exposed, Uninfected: Outcomes and Risk Factors

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Objective: Children who are HIV-exposed uninfected (CHEU) are a high-risk population for compromised neurodevelopmental outcomes due to perinatal HIV and antiretroviral therapy exposure as well as additional health and psychosocial burdens. There is limited understanding of the long-term outcomes of CHEU and contributions of associated risk factors. The present study investigated intellectual, academic, and language abilities in CHEU and children who are HIV-unexposed uninfected (CHUU).
Participants and Methods: CHEU and CHUU 6 to 10 years of age underwent neurodevelopmental assessments through the Kids Imaging and Neurocognitive Development (KIND) study at the Hospital for Sick Children in Toronto, Canada between January 2020 and March 2022. CHUU were recruited from the community with similar sociodemographic backgrounds based on residential areas in Toronto and parental income levels. Measures of Full-Scale IQ (FSIQ), Verbal Comprehension (VCI), Visual-Spatial skills (VSI), Fluid Reasoning (FRI), Working Memory (WMI), and Processing Speed (PSI) were evaluated with the Wechsler Intelligence Scale for Children – Fifth Edition. Single-word reading, math, and spelling abilities were assessed with the Wechsler Individual Achievement Test – Second Edition. Core Language, Receptive Language, and Expressive Language skills were assessed with the Clinical Evaluation of Language Fundamentals – Fifth Edition. Analyses of variance and covariance were performed to investigate group differences and the relation between neurodevelopmental measures and sociodemographic factors. Maternal education

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levels ranged from less than high school to post-university education and household income levels ranged from less than $25,000 to over $100,000. Significance was held at $p \leq 0.05$.
Results: Thirty-six CHEU (20 female, 8.79 ±1.55 years) and 31 CHUU (13 female, 8.53 ±1.51 years) children were included. For both groups, mean standardized scores of the cognitive abilities assessed were in the average range apart from math skills, which were in the low average range. There were no between-group differences identified for intellectual, academic, and language abilities. Analyses including maternal education and household income levels revealed strong associations with several aspects of cognition irrespective of group. Higher education levels and higher household income were significantly associated with higher FSIQ, VCI, VSI, PSI, core language, receptive language, and expressive language. Additionally, higher household income was associated with higher math scores.
Conclusions: CHEU performed similarly to CHUU of comparable sociodemographic backgrounds on assessments of intellectual functioning, academic abilities, and language skills from this interim analysis of the data thus far. Math skills were slightly lower than age expectations for both groups, and less developed in lower-income households. The association between sociodemographic factors with intellectual and language functioning highlights a critical need for mitigating these risk factors on child neurodevelopment.

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45 Longitudinal Data Collection of Neurotoxicant Exposures and Health Symptoms in Gulf War Veterans.

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Objective: It has been documented in cross-sectional studies that neurotoxicant exposures during the Gulf War (GW) have been causally related to GW Illness (GWI), a chronic multisymptom illness (CMI) with central nervous system involvement. As GW veterans (GWVs) continue to experience chronic medical issues post-deployment, longitudinal studies are needed to track symptom progression. The Ft. Devens Cohort (FDC) is the longest running cohort of GWVs with initial baseline surveys in 1991. In the 1997-1998 FDC follow-up, deployed veterans with reported neurotoxicant exposures were found to have higher rates of health symptoms and CMI than those reporting no such exposures. Exposures included pesticides, debris from Scud missiles, chemical weapons, and smoke from tent heaters. During the latest FDC follow-up study (2013-2017), these same exposures were associated with chronic medical conditions. Those reporting exposure to chemical weapons as well as pyridostigmine bromide (PB) pills had increased odds of reporting cardiovascular risk factors, including high blood pressure, diabetes, and high cholesterol. While these follow-ups identified important cross-sectional exposure-based health outcomes, changes in symptom reporting from each individual over time were not considered. Neurotoxicant exposures are known to cause delayed or latent effects with time or additional stressors (e.g., aging). Thus, more research, like the present analysis, is needed to examine how GWVs' symptoms have changed over time.
Participants and Methods: Veterans that returned from deployment through Ft. Devens, Massachusetts were recruited. These individuals were followed over 25 years as part of the FDC with 3 separate follow-up health symptom surveys administered in 1992-1993, 1997-1998 and 2013-2017. Exposures of interest included PB pills, chemical weapons, and tent heaters. Veterans were categorized into 5 a priori trajectory groups for each health symptom and CMI clinical case status: never reported symptom, develops symptom, mixed reporting of symptom, remitting symptom, and consistent reporting of symptom. Multinomial logistic regression models were used to investigate associations between these trajectories and neurotoxicant exposures.
Results: Results indicate that ingestion of more than 21 PB pills was associated with consistent reporting of fatigue and pain, as well as the development of difficulty concentrating, depressed mood, and nervousness over time. Chemical weapons exposure was associated with both the consistent reporting and the development of neurological symptoms over time. Reported exposure to tent heater exhaust was associated with the later development of gastrointestinal and pulmonary symptoms. Veterans reporting exposure to more than 21 PB pills were more than 8 times as likely to consistently meet criteria for CMI over time.
Conclusion: This study highlights the importance of the continued documentation of GWVs' health symptoms and the importance of exposure-outcome relationships over time in these veterans, now 30 years post-deployment.

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Symptoms were identified that have resolved, developed, and remained consistent over time. This will help health care providers in diagnosing exposure-based symptoms and will further contribute to the development of symptoms-based treatment initiatives, until a GWI-specific treatment is developed. Future studies need to assess the impact of normal aging on these exposure-based health outcomes.

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46 Toxic Wounds and Cognition in US Gulf War Veterans from the BBRAIN Repository Network

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Objective: The Boston, Biorepository and Integrative Network (BBRAIN) for Gulf War Illness (GWI) was created to provide a repository of objective biomarkers and cognitive, demographic and war-related exposures in US Gulf War (GW) veterans. Symptoms of GWI include fatigue, pain, and cognitive problems. Our prior studies showed cognitive decrements in veterans with GWI compared with healthy GW veterans that correlated with war-related exposures. However, these studies were in relatively small samples and need to be validated in larger cohorts. The next step was to compare these outcomes in a larger cohort shared from prior studies that now make up the BBRAIN repository. This study compared a cognitive battery including attention/executive and memory outcomes with war-related exposures in veterans with GWI versus healthy GW veterans.
Participants and Methods: Participants included 411 GW veterans, who were deployed to the Persian Gulf between August 1990 and July 1991, including 312 with GWI and 99 healthy controls. Controls were slightly older and more educated than GWI cases. The study population had a mean age of 53 years and included 16% women. Cognitive batteries were administered to all participants including the Conners Continuous Performance Test Third Edition (CPT3), Delis-Kaplan Executive Function System (D-KEFS) Color-Word Interference, and the California Verbal Learning Test Second Edition (CVLT-II). War-related exposures to chemical weapons, anti-nerve gas pills and pesticides were self-reported by study surveys.
Results: After adjusting for age, gender and education level, veterans with GWI had significantly higher mean CPT3 omission and commission errors, D-KEFS Color-Word Interference times on all Trials and lower CVLT-II Trials 1-5, short-and-long-delayed recall scores ($p<0.05$). In addition, GWI cases who were exposed to oil well fires, pesticides or heard chemical weapon alarms for 7 or more days, had significantly more CPT3 errors, lower CVLT-II recall scores and higher D-KEFS Color-Word Interference Trial times than non-exposed GW controls ($p<0.05$). GWI cases who reported taking anti-nerve gas pills for a week or more, had significantly more CPT3 errors and higher DKEFS times than non-exposed controls ($p<0.05$).
Conclusions: This study documents and validates reduced performance on tasks of sustained and divided attention and verbal memory in veterans with GWI. It also documents the association of these decrements with environmental exposures during the war.

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47 Examining the Neurocognitive Effects of Perceived Stress upon Latinx People with HIV

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Objective: U.S.-residing Latinx adults are at increased risk for HIV-infection, receive poorer healthcare, and exhibit lower rates of medication adherence compared to their non-Latinx white (NLW) counterparts. This can lead to faster HIV disease progression and increased risk for neurocognitive impairment. Moreover, stress resulting from life events is specifically associated with faster HIV disease progression. Given that Latinx people with HIV (PWH) are at greater risk for experiencing life stressors, it is critical to consider the effects of stress as it relates to neurocognitive impairment in the Latinx population. The purpose of this study was to determine the independent and interactive effects of Latinx ethnicity and perceived stress on neurocognitive impairment within a sample of Latinx and NLW PWH. We hypothesized that Latinx ethnicity and greater perceived stress would independently and interactively predict worse neurocognitive impairment.
Participants and Methods: Latinx (*n*=83; mean age=45.2, *SD*=7.7) and NLW (*n*=43; mean age=50.5, *SD*=9.6) adult PWH completed the Perceived Stress Scale (PSS; self-report measure of recent stress) and a comprehensive neuropsychological battery assessing executive function, verbal fluency, processing speed, attention/working memory, learning, memory, and motor function. Demographically-adjusted norms were used to calculate average global and domain T-scores. A series of multiple linear regressions were computed including the following independent variables: ethnicity (Latinx vs. NLW), PSS Total Score, and the interaction term (ethnicity x PSS Total Score). The dependent variables included average T-scores for global neurocognition and the seven neurocognitive domains (detailed above).
Results: Results of the regression analyses revealed that Latinx ethnicity independently predicted lower average Learning T-scores (b=-.25; $p< .05$). The PSS Total Score independently predicted lower Global Neurocognition, Learning, and Memory T-scores (b=-.23, b=-.26, and b=-.22, respectively; all *p*s< .05). Results further showed no significant interaction effects between ethnicity and stress upon neurocognition (all *p*s>.05).
Conclusions: Latinx ethnicity and higher perceived stress both independently predicted worse neurocognitive functioning within learning and delayed recall tasks, while greater perceived stress was also independently related to worse global neurocognition. However, there were no significant interactive effects of Latinx ethnicity and perceived stress upon any neurocognitive outcomes. These findings support the existing literature underscoring HIV-related health inequities and the increased consequences of stress experienced by Latinx PWH. Furthermore, these findings reveal that Latinx PWH who are more stressed may have marked deficits in learning and memory tasks. This is especially important considering the importance of learning and memory in daily living activities of the aging population of Latinx PWH.

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48 Agenesis of the Corpus Callosum: Developmental Trajectories Through Adolescence

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Objective: Dysgenesis of the corpus callosum (DCC) is an umbrella term for developmental malformations of the corpus callosum, including complete absence (agenesis), partial absence (partial agenesis), and hypoplasia (thinning) of the corpus callosum (Schell-Apacik, et al., 2008). DCCs are anatomic diagnoses that are identified in-vivo by visualizing the brain through neuroimaging (ultrasound, CT, or MRI; Paul, et al. 2007). Agenesis of the Corpus Callosum (AgCC) is one of these congenital brain malformations that affect the area of the brain responsible for the interhemispheric transfer of information. Individuals with AgCC tend to have specific deficits including reduced interhemispheric transfer of sensory-motor information, reduced cognitive processing speed, and deficits in complex reasoning and novel problem-solving, among others. Cases of AgCC are seen internationally. We were interested in evaluating deficits that can occur in other areas of development including communication, socialization, and daily living skills.
Participants and Methods: The Vineland-3 Comprehensive Interview Form (Hill et al., 2017) was utilized for data gathering with parents of children and adolescents between the ages of 28-195 months (n=63, equal girls and boys) who have a formal diagnosis of AgCC. Participants were enrolled in a longitudinal study conducted at the California Institute of Technology. Vineland-3 interviews were conducted via telephone with participants whose children met inclusion criteria. Responses were recorded in the Caltech Qualtrics account and authors were provided with an encrypted file for data analysis.

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Results: Generalized delays in the development of children and adolescents with AgCC were found across all domains including Communication, Socialization, Daily Living Skills and Motor Skills ($p < .0001$) when compared to the manual norms. Gender alone did not show any differences in domains. Significant interactions indicated that adolescent girls have the most impairment in the Daily Living Skills, specifically in the Play and Leisure subdomain ($p=.031$). Children and adolescents with AgCC are more likely to display developmental delays in communication, socialization, and daily living skills when compared to the age equivalent norms with the skill and abilities gap between those with AgCC and typical adolescents becoming greater with age. These skill domains are intertwined and thus delays in one area are likely to affect other areas thus leading to the difficulties observed in those with DCC including social interaction, reasoning abilities, and communication. Children and adolescents with AgCC are more likely to display developmental delays and early intervention is critical in order to develop compensatory strategies and/or techniques.

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49 Social Skills of Young People with Down Syndrome during COVID-19 Pandemic

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Objective: Social skills include personal aspects, interaction and social abilities. The nature of these capacities has not been explored in young people with Down syndrome (DS) during the social isolation of the COVID-19 pandemic.The main objective of this online study was to describe the social profile of a group of young Mexicans with DS and to explore the variables related to their psychosocial profiles.
Participants and Methods: Participants were 30 young people with DS from 15 to 29 years of chronological age (CA) whose mental age (MA) was 6.62 years who lived in Mexico City and the interior of Mexico without associated neurological or psychiatric problems. An informed consent, a sociodemographic questionnaire, a mental age test (Raven) and a socialization battery (BAS-2) were applied, which were answered by the parents or guardians of the participants. Social behavior was analyzed in Facilitative domains of socialization (Leadership, Joviality, Social Sensitivity, Respect/Self-control), in Disruptive domains of socialization (Aggressiveness/Stubbornness, Apathy/Withdrawal, Anxiety/Shyness) and in a General Socialization Scale. All the scales were applied through Zoom video calls and the approximate total time of the evaluations was 70 minutes.
Results: Overall, participants' scores on the Facilitative domains were above average and their scores on the Disruptive domains were below average, as expected. The scores on the Respect/Self-control scale correlated positively with CA; and the General Socialization Scale correlated positively with MA.
Conclusion: No deficiencies were found in the social skills of young people with DS in any of the domains. The development of the social profile associated with CA and MA stimulates cognition and promotes the independence, autonomy and proactivity of young people with DS. Likewise, it is essential to consider the role of parents in regulating the behavior of young people with DS, which has been an important factor in managing their social isolation during the COVID-19 pandemic. The present study is relevant to know the effect of social isolation in people with DS as well as the contextual, curricular and recreative elements that promote cognitive and social stimulation within their homes.

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50 Hemispheric Lateralization in Dyslexic and Typically Reading Children

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Objective: Developmental Dyslexia (DD) is the most common of the learning disabilities, defined by difficulties with accurate and/or fluent word reading and spelling. Although several studies have noted structural and functional brain differences between children with dyslexia and their typically developing peers, research results regarding the association of hemispheric lateralization and dyslexia are ambiguous at best and indicate a need for further clarification. The aim of this study was to investigate laterality in children with DD. Our main hypothesis was that dyslexics would show non typical hemispheric lateralization.
Participants and Methods: A total of 26 individuals participated in this study (Mean Age = 11.9 ± 1.0). The first group consisted from 13

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students who were diagnosed with dyslexia and attended regular public schools. A comparison group was formed of students who attended the same classes (N = 13), and these were pair matched for age and gender with dyslexics (1 dyslexic : 1 control). Hemispheric lateralization was investigated through two different types of tests. More specifically, laterality was assessed through Dichotic Listening Tasks (DLT) in free recall mode and three independent tests in the form of self-report questionnaires. DLT consisted of a) a dichotic digit task (DDT), b) a dichotic word task (DWT), c) a dichotic consonant – vowel (DCV) syllables task, d) a dichotic task with musical instruments (DMI). Additionally, three self-reporting tests were used to assess laterality: a) the Edinburgh Handedness Inventory (EHI), b) the Preference Test (PT), c) the Hemispheric Mode Indicator (HMI).

Results: Analysis did not revealed statistically significant differences between the dyslexic and the comparison group for both the Dichotic Listening Tasks and the self-reporting questionnaires. Despite the lack of statistical significance, results show that there was a mild trend, in dyslexics comparing to their typical developing peers, in favor of ambidexterity. This mild trend in favor of bilaterality in dyslexics appeared in the PT scores as well as in the HMI scores. Additionally, the scores of the three independent self-report tests showed statistically significant correlations between them.

Conclusions: The results of this study are in contrast with previous research data. Results do not verify our hypothesis as they showed that there are no differences in hemispheric lateralization between dyslexic students and their peers of typical development. This differences from previous research, and thus an explanation to this contrast of results, could be attributed mainly to the small sample size.

51 Neurocognitive Subtypes of Developmental Dyslexia

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Objective: Developmental dyslexia constitutes a specific learning difficulty of written language, especially in relation to reading, and is characterized by its wide variety of symptoms. Various hypotheses have been suggested regarding the causes of the disorder, either at the cognitive or the biological level. The purpose of the present study was to investigate the neurocognitive subtypes of developmental dyslexia aiming to determine whether children with dyslexia can be divided into distinct subtypes based on their performance in various abilities and skills that have been related with developmental dyslexia.

Participants and Methods: The sample of our study consisted of 101 children drawn from the 3th, 4th, 5th and 6th grades of primary schools (mean age 11.15 years), all of whom had been diagnosed with dyslexia by an official public diagnostic center for special educational needs. Students were given a series of tests assessing a wide range of abilities and skills. Specifically, the phonological, memory and attention abilities, the processing speed, motor and visual-motor skills, and the visual perception were assessed.

Results: Cluster analysis revealed that children with dyslexia can be divided into three subgroups. The first subgroup consisted of children who were distinguished based on their performance in tests assessing the phonological, memory and attention abilities, the processing speed along with the visual perception and motor skills. The second subgroup consisted of children who were differentiated based on their performance in the areas of motor and visual-motor skills, as well as the memory abilities. The third subgroup consisted of children who were differentiated in their motor performance only.

Conclusions: The findings of the study suggest that school-aged children accredited with developmental dyslexia can be distinguished into subgroups with particular neurocognitive characteristics. In addition, our results shown that most dyslexic children experience difficulties in more than one cognitive domains and offer empirical support to current models which support the existence of multiple neurocognitive deficits in developmental dyslexia.

52 Cognitive Functioning of Adolescents who Experienced Childhood Maltreatment: Insights from Sensitive Periods

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Objective: Maltreatment is a severe form of adversity associated with several consequences on brain and neuropsychological development. The mechanisms underlying cognitive deficits are poorly understood. An interesting avenue lies in the research of sensitive periods, where the influence of the environment on the development of specific cognitive functions is particularly important. Such sensitive periods remain scarcely studied in neuropsychology and among adolescents. The present study aims to better understand the neuropsychological functioning of adolescents who experienced maltreatment in childhood by identifying sensitive periods to which the effects of maltreatment on cognitive development are most important.
Participants and Methods: Thirty-seven adolescents recruited from welfare service centers were grouped based on the period of development of their first documented exposition to maltreatment: infancy (0-2 y/o), preschool (2-5 y/o) and school age (5 y/o and older). These subgroups were compared to 40 control adolescents on visuospatial, attentional, memory, and executive skills.
Results: The Dunnett tests showed that the three subgroups of adolescents who had experienced maltreatment had lower scores in cognitive flexibility compared to the control group. However, there were differences whose nature and magnitude varied according to the time of exposure to maltreatment for visuospatial skills, working memory, episodic memory, inhibition and planning.
Conclusions: These results suggest that there may be sensitive periods in the development of specific cognitive processes and that adolescents who have experienced maltreatment generally show a shared executive impairment. The analysis of sensitive periods could allow a fine interpretation of the differential effect of exposure to maltreatment on neuropsychological development.

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53 Adaptive Skills and Executive Function in Young people with Down Syndrome during COVID-19 Pandemic

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Objective: There have been few studies that inquire, jointly, what is the relationship between adaptive skills and executive function in young people with DS in order to know what cognitive skills (for example, working memory, flexibility, planning or organization) would allow young people with DS to lead an independent life and enter the workplace. Therefore, the objective of this project was to explain the relationship between Adaptive Skills and Executive Function in young people with Down syndrome.
Participants and Methods: 35 young people with DS participated with a chronological age of 19.06 years and whose mental age was 6.59 years (measured with the Raven Test). The participants were recruited through public and private care institutions and lived in Mexico City and the interior of the Republic. Adaptive Skills (Social behavior) were measured with the Socialization Scale (BAS-2), and Executive Function was measured with BRIEF-2. The BRIEF-2 scale includes: Inhibition, Flexibility, Emotional Control, Initiative, Working Memory, Planning, Self-Control and Task Supervision. The Socialization Scale was analyzed in Facilitative domains of socialization (Leadership, Joviality, Social Sensitivity, Respect/Self-control), in Disruptive domains of socialization (Aggressiveness/ Stubbornness, Apathy/Withdrawal, Anxiety/Shyness) and in a General Scale of Socialization. In addition to this, an informed consent and a sociodemographic questionnaire were applied to the parents/guardians of the participants in order to investigate general aspects of their children's development. The evaluations were carried out online through the Zoom platform to the primary caregivers of the participants and the total duration of the applications was 80 minutes.
Results: The results showed different correlations between several subscales of social behavior and executive function. Leadership and Joviality were negatively correlated with emotional control. This means that high popularity and extraversion entail less affectation in emotional regulation. Apathy / Withdrawal was

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positively correlated with Self-control, which means that the greater the introversion, the greater the impact on the initiative to make decisions. Likewise, the General Socialization Scale was positively correlated with the Working Memory, which implies that, the greater the general social behavior, the less affectation to manipulate temporary information.
Conclusions: Adaptive social abilities are related to less deterioration in the different areas of Executive Function in young people with Down syndrome. That is, there is a link between the functions that regulate thoughts, emotions, and actions and performance at a social level (involves aspects of personality, adaptation, and self-care). The findings represent psychoeducational support for parents, as well as an important scientific advance in the field of cognitive research in people with DS.

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54 Neuropsychological profile in children with congenital heart disease undergoing surgery in the neonatal period

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Objective: This study aimed to describe the neuropsychological profile of a sample of children with complex congenital heart disease and to study possible correlations of neuropsychological findings with risk factors related to surgical treatment.
Participants and Methods: this is a retrospective cross-sectional study of a cohort of 20 subjects with congenital heart disease aged 8-11 years who underwent surgery during the neonatal period with extracorporeal circulation. All of them were evaluated with neuropsychological tests and questionnaires graded in the normal population to measure global cognitive capacity, linguistic functions, visuoconstruction abilities, memory, attentional and executive functions and behaviour.
Results: the mean scores of intelligence, all cognitive functions and behaviour are within the normal range. However, more than half of the participants obtain scores that are far from the standards of the normal population, especially in those tasks related to verbal episodic memory, semantic memory, executive and attentional functions. An association has been found between perioperative risk factors and some neuropsychological findings. However, this result lacks clinical relevance considering the descriptive design of the study.
Conclusions: neurodevelopmental disorders, and specifically neuropsychological disorders, are frequent in children with congenital heart disease. These alterations are multifactorial and have been related to surgical factors and brain abnormalities that occur prenatally. A systematic clinical follow-up with a neuropsychological evaluation is necessary in school-aged children to detect deficits early and design adequate educational strategies.

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55 Cognitive Performance, Brain Volumetry and Blood Phenylalanine Levels in Adult Phenylketonuric Patients

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Objective: Phenylketonuria (PKU) has been described as an autosomal recessive disorder of metabolism characterised by increased concentrations of phenylalanine (Phe) in the blood due to the malfunctioning of the hepatic enzyme phenylalanine hydroxylase (PAH). Although an early and continued dietary treatment since birth could prevent most of the brain-related complications, untreated patients experience severe intellectual impairment, behavioural problems, and neurological damage. The aim of the present study is to investigate neuropsychological performance and possible structural brain abnormalities in treated adult PKU patients, as well as its relationship with disease control measured by blood Phe levels.
Participants and Methods: Twenty-two adult PKU patients and 12 healthy controls (HC) underwent comprehensive neuropsychological assessment and T1-weighted magnetic resonance imaging data obtained with a 3T scanner. FreeSurfer (v.7.1) was used to obtain global volumetric measures (cortical and subcortical grey matter and white matter). Statistical analyses of sociodemographic, neuropsychological, volumetric and clinical data were conducted using IBM SPSS, version 27.0.1.0 (IBM Corp., Armonk, N.Y., USA), with the statistical significance threshold set at $p< 0.05$. Neuropsychological impairment in the PKU group was defined as Z-scores below 1.5 according to normative data for each test.
Results: Thirty per cent of patients showed cognitive impairment in the full-scale IQ of the WAIS-IV, 20% in the Verbal Comprehension Index of the WAIS-IV, 36.4% in the Perceptual Reasoning Index of the WAIS-IV, 54.5% in the Working Memory Index of the WAIS-IV, 36.4% in the Processing Speed Index of the WAIS-IV, 50% in the Trail Making Test A (TMT-A), 40.9% in the Trail Making Test B, 31,8% in the total of the Rey-Auditory Verbal Learning Test, 13.6% in the delayed recall of the Rey-Auditory Verbal Learning Test, 18.2% in the copy of the Rey-Osterrieth Complex Figure (ROCF) and 22.7% in the immediate recall of the ROCF. High Blood Phe levels were negatively correlated with performance in the Matrix Reasoning subtest of the WAIS-IV (*r=-0.566; p=0.009*), Block Design subtest of the WAIS-IV (*r=-0.674; p=0.001*), Digit Forward subtest of the WAIS-IV (*r=-0.450; p=0.047*), Digit Backward subtest of the WAIS-IV (*r=-0.462; p=0.040*), Symbol Search subtest of the WAIS-IV (*r=-0.470; p=0.036*), Digit Symbol Coding subtest of the WAIS-IV (*r=-0.580; p=0.007*), copy of the ROCF (*r=-0.576; p=0.008*), and immediate recall of the ROCF (*r=-0.714; p< 0.001*).
There were no differences in age, sex or education between adult PKU patients and HC. Adult PKU patients showed a significant lower volume in the cerebral white matter (*U=39.000; p=0.002*) in comparison with HC. Furthermore, cerebral white matter volume positively correlates with Z-scores of the Digit Backward subtest of the WAIS-IV (*r=0.443; p=0.016*) and the TMT-A (*r=0.408; p=0.028*).
Conclusions: Treated adult PKU patients showed variable cognitive outcomes with a higher proportion of impairment in working memory, which was associated with white matter volume reduction. Cognitive performance in treated adult PKU patients was not only associated to structural brain abnormalities but also with disease control at the time of the assessment.
Funding: The study was supported by La Marató de TV3 (code: 202014-30-31-32).

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56 Language-Specific Sites in the Supplementary Motor Area: Evidence from Electrical Stimulation Mapping

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Objective: In spite of a few neuroimaging and neuropsychological studies suggesting that the supplementary motor area (SMA) encodes lexical information, this area has been most strongly associated with articulatory motor initiation. Since articulation is assumed to be language-independent, the SMA has been often

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overlooked when identifying language-specific sites during electrical stimulation mapping (ESM) on multilingual patients undergoing awake brain surgery. Most often, only the perisylvian language network is considered in this regard, due to its well-known critical role in language representation. However, the SMA may contain language-specific sites as well, if in fact it encodes lexical information. Therefore, the objective of this study is to investigate whether multilinguals show language-specific sites in the SMA.
Participants and Methods: We report four multilingual patients with diverse current language-dominance profiles (L1 = most dominant language; L2, L3, L4 = second, third, and fourth most dominant language, respectively). Patient **MT** (female, 67yo) was multilingual with Catalan (L1), Spanish (L2, age of acquisition (AoA) = 3) and English (L3, AoA =10). Patient **EM** (male, 37yo) was bilingual with Catalan (L1) and Spanish (L2, AoA = 3). Patient **MM** (female, 38yo) was a simultaneous bilingual with Spanish (L1) and Catalan (L2). Patient **JP** (female, 54yo) was multilingual with Polish (L1), Spanish (L2, AoA = 30), English (L3, AoA = 12), and German (L4, AoA = 27). All patients underwent ESM to identify language-relevant sites prior to the removal of a tumor located in or near the left SMA. The site was considered language relevant if the electrical stimulation hindered the patient's ability to perform a verb generation task (the patient needed to produce a verb associated with an auditorily presented name; e.g., bed à sleep). Only pre-operatively accurate responses were included in ESM. Languages were tested in order of dominance.
Results: We found language-specific sites in the left SMA of all patients. Patient **MT** showed specific sites for all her 3 languages in the SMA-proper. She also had specific sites for her L2 and L3 in the pre-SMA. Patients **EM** and **MM** showed specific sites for their two languages in the pre-SMA. Patient **MM** additionally showed a specific site for her L1 in the SMA-proper. Patient **JP** showed specific sites in 3 out of her 4 languages (no site was found for her L2). These sites were placed in the pre-SMA in the case of her L1 and L3, and in the SMA-proper in the case of her L4.
Conclusions: The SMA contains language-specific sites. This is congruent with prior neuroimaging and neuropsychological studies suggesting that, besides articulatory motor control, the role of this area involves language representation. Critically, this finding highlights the need of testing the different languages of multilingual patients during ESM involving the SMA to avoid multilingual aphasia as a collateral effect of surgery.

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57 The Relations Between White Matter and Verbal Short-Term Memory in Post-Stroke Aphasia

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Objective: Verbal short-term memory (vSTM) deficits are associated with language processing impairments in people with aphasia. Importantly, the integrity of vSTM can predict word learning ability and anomia-therapy gains in aphasia. While the recruitment of homologous language structures in the contralesional hemisphere has been proposed as a possible mechanism for aphasia recovery, little is known about the post-stroke reorganization of white-matter pathways in relation to vSTM. Here, we investigated the relationship between the integrity of language-related white matter tracts and vSTM ability in aphasia.
Participants and Methods: Nineteen patients with post-stroke chronic aphasia underwent TALSA battery subtests for vSTM evaluation, including nonword repetition (phonological STM), pointing span (lexical-semantic STM without language output) and repetition span (lexical-semantic STM with language output). Using a manual deterministic tractography

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approach, we investigated the micro and macrostructural properties of the arcuate (AF), inferior fronto-occipital (IFOF), inferior longitudinal (ILF) and uncinate (UF) fasciculi, and the frontal aslant tract (FAT). Finally, we assessed the relationship between individualextracted tract values and vSTM scores.
Results: Results revealed significant correlations between volume measures of the right UF and all three vSTM scores. Significant uncorrected trends were also observed between the volume of the Long segment of the left AF and the three vSTM measures, as well as between the non-word repetition score and the volume of both the left UF and the right IFOF.
Conclusions: These results suggest that the macrostructural organization of the right UF is associated with phonological and lexical-semantic vSTM in aphasia and highlight the potential compensatory role of homologous ventral white matter language tracts in supporting recovery of vSTM function after brain insult. Results also seem to support models favoring a common neural system for language and vSTM.

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58 Expressive and Receptive New Word Learning in Post-Stroke Aphasia

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Objective: Word learning tasks allow to assess lexical learning capacity in people with aphasia (PWA), yielding potentially important information for prognosis and treatment that standard language measures do not provide. We designed a short novel word learning task to examine expressive and receptive novel word learning in PWA relative to healthy controls (HC). Moreover, we assessed whether phonological cueing aids expressive learning, and examined associations between language, cognitive and lesion-related factors and word learning in PWA.
Participants and Methods: Participants were 12 PWA (2 female, age 56.67±10.42 years, 27.92±10.4 months post left hemisphere stroke) and 19 HC (12 female, age 59.89±7.63 years) with comparable age and education ($p \geq .25$). PWA underwent neuropsychological assessments measuring aphasia severity (BDAE), receptive (BDAE Word comprehension) and expressive lexical-semantic processing (BNT), phonological processing and verbal short-term memory (TALSA subtests), and completed structural MRI to assess lesion volume.
Participants completed an experimental task that required learning 6 new pseudoword-referent mappings across 3 training cycles. Each cycle included a naming test (expressive learning) and a recognition test (receptive learning). Naming test 3 provided a phonological cue as needed. Naming responses were scored with a permissive criterion (1 phoneme variation in an otherwise correct response), except for the contrast between naming test 3 with and without phonological cueing to best capture cueing effects on expressive learning. PWA were compared to HC in their learning performance at the group and individual level (modified t-test, Crawford et al., 2010).
Results: A mixed-model group x session ANOVA revealed a significant increase in *expressive learning* over time [$F(2,58)=21.22$, $p< .001$] with superior learning for HC relative to PWA [$F(1,29)=4.87$, $p=.035$], but no interaction [$F(2,58)=0.15$, $p=.823$]. Expressive learning on naming test 3 improved significantly with *phonological cueing* for PWA [$t(11)=-3$, $p=.012$] but not for HC [$t(18)=-1.93$, $p=.069$]. Five PWA showed impaired expressive learning compared to HC (naming test 3 $p\leq.05$, *modified t-test*, one-tailed).

A second group x session ANOVA showed a significant increase in *receptive learning* over time [$F(2,58)=25.15$, $p< .001$] with overall superior performance for HC [$F(1, 29)=6.73$, $p=.015$], yet different learning patterns across groups over time [$F(2,58)=6.94$, $p=.006$]. Post-hoc comparisons revealed significantly superior learning for HC relative to PWA only on recognition test 1 [$t(29)=-3.441$, $p=.002$]. Nine PWA demonstrated above-chance receptive learning (recognition test 3 $p\leq.0032$, *binomial test,* one-tailed) and 3 PWA showed impaired learning compared to HC (recognition test 3 $p=.001$, *modified t-test*, one-tailed).
Lesion volume was negatively correlated with expressive [naming test 3, $r(9)=-.712$, $p=.031$] and receptive learning outcomes [recognition test 3, $r(9)=-.803$, $p=.009$] in PWA. Additionally, expressive lexical-semantic processing was significantly correlated with receptive learning [$r(12)=.675$, $p=.016$].
Conclusions: PWA show significant receptive word learning as compared to HC. Most PWA also demonstrate expressive

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word learning comparable to HC and benefit from phonological cueing. Lesion volume and expressive lexical-semantic processing modulate word learning in aphasia. Findings suggest a brief, clinically feasible word learning test can capture individual variability in lexical acquisition capacity in PWA, and could thus serve for screening and prognostic purposes in the future.

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59 Influence of Bilingualism on Cognition of Patients With Expansive Brain Lesions on the Dominant Hemisphere

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Objective: Bilingualism and hence, second language experience, has been related to differences in language processing and executive control processes. Moreover, these differences are evident beyond cognitive abilities, and learning a second language has been demonstrated to influence the structure, functionality, and neuroplasticity of the brain. In the present study, we aim to determine the influence of being bilingual on cognitive performance in patients under brain damage situations like expansive brain lesions, assessed both preoperatively and intraoperatively, and analyze this effect on neuroplasticity considered it in terms of cognitive performance after awake surgery.
Participants and Methods: A total of 101 patients, including 57 Spanish-Catalan bilinguals and 44 Spanish or Catalan monolinguals, with expansive brain lesions in language eloquent areas operated under awake surgery have been included. All of them underwent a neuropsychological assessment before and 4- months after the surgery, including language, executive function, and semantic knowledge evaluation, as well as language monitoring during surgery. The analysis focused on all these cognitive tests used in the neuropsychological battery. First, we assess differences in pre-surgery and post-surgery assessment between bilinguals (BL) and monolinguals (ML). Then, we study the presence of changes due to surgery comparing preoperative and postoperative neuropsychological results. Finally, we used linear regressions to assess the relationship between naming performance during awake surgery, defined it as the score in the last denomination test done awake, and cognition at 4-months follow-up.
Results: The comparison between ML and BL at pre-surgery assessment showed higher proficiency in focalized attention for the BL group. During surgery, no differences were observed on denomination task between groups although the score obtained in the ML group was positively related to language results after surgery, specifically in denomination, repetition, and verbal fluency tasks. On the other hand, in the BL group, intraoperative naming performance was only positively associated with repetition after surgery. At 4-months follow-up, executive functions and denomination worsen when compared with pre-surgery level for all the patients. Despite the decline, BL keeps outperforming ML on focalized attention.
Conclusions: Our results describe differences in cognition between BL and ML in patients with brain damage such as those with expansive brain lesions in the dominant hemisphere. In addition, we highlight the advantage of being BL in specific cognitive domains, especially in executive functions, even after surgery. Furthermore, the positive relationship in ML not observed in the BL group between language performance during surgery and language at 4-month follow-up suggests a significant plasticity effect in BL before surgery to compensate for possible deficits due to the intervention, leading us to consider additional plasticity mechanisms depending on the number of languages acquired. In summary, bilingualism confers to the subject differences in cognitive competence and induces brain changes that will prove crucial in the recovery after brain damage in language-related functional areas.

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60 Intraoperative Neuropsychological Assessment During Awake Craniotomy in Aphasia Prevention

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Objective: Surgical treatment of tumors located close to eloquent areas of language functions carries the risk of postoperative deficits, e.g. aphasia, agraphia, alexia. Language impairment significantly reduce the quality of life, and often prevent patients from fully returning to their previous lifestyle, especially professional activity. If there is a risk of postoperative language deficits, it is absolutely crucial to plan the procedure in a way that will increase the safety of the procedure in order to save areas of the brain responsible for language functions. The most effective and accurate way to prevent damage to key areas for specific functions is awake craniotomy procedure with intra-operative brain stimulation and neuropsychological evaluation. The aim of the study was to present the method of intraoperative assessment of language functions during brain stimulation performed in our center and to analyze the frequency of postoperative language deficits.
Participants and Methods: In forty-four patients with lesions of the dominant hemisphere, it was decided to perform awake surgery with intraoperative evaluation of verbal functions. In patients with lesion in the frontal lobe (n = 14), temporal lobe (n = 12), parietal lobe (n = 12) and insular cortex (n = 6) brain mapping was performed by stimulation with a bipolar and monopolar electrode, both cortical and subcortical regions. Depending on the location of lesions, the following abilities were tested: naming, spontaneous speech, reading, writing, speech understanding and repetition.
Results: The areas responsible for language functions were identified using intraoperative brain stimulation in all patients. In some cases, it resulted in a change in the tumor resection plan (method, direction and / or extent of removal) so that the most important areas were not damaged. After the surgery twenty-one (48%) patients had no language deficits, seventeen (38.5%) patients had minor short-term language deficits (withdrawing spontaneously or with neuropsychological rehabilitation within 2 weeks) and six (13.5%) patients had moderate language deficits lasting more than 2 weeks.
Conclusion: After awake surgery with intra-operative brain stimulation and neuropsychological evaluation long-standing aphasia was very rare, therefore it should be treated as an effective method of removing tumors located close to eloquent areas for language function. Awake surgery is also worth considering in case of lesions located near functionally important brain areas for other cognitive functions.

Plenary Keynote: Brain and Behaviour following very Preterm Birth

Presenter: Chiara Nosarti

12:00-13:00h
Thursday, July 7, 2022

Lunch Break

13:00-14:00h
Thursday, July 7, 2022

Paper Session 10: Neuropsychology of ADHD in childhood and adulthood

14:00-14:50h
Thursday, July 7, 2022

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01 Sensory and neurophysiological processing in infants with familial ADHD: Lessons learned from a pilot study

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Objective: ADHD is a neurodevelopmental disorder characterised by persistent inattention, impulsivity, and hyperactivity. Adults and children with ADHD often report atypical sensory processing, including poor sensory reactivity and modulation. There is also evidence of altered neurophysiological processing linked to attention processes using electroencephalography (EEG) and event related potential (ERP) methodologies in children and adults with ADHD. Research shows that children with parents or siblings who have a diagnosis of ADHD are more likely to obtain an ADHD diagnosis themselves. The aim of this study was to investigate ERP and behavioural markers of attention and sensory processing in infants with and without a family history of ADHD. Based on the findings reported for school-age children with ADHD, it is hypothesised that infants with a family history of ADHD will show more attenuated ERP amplitudes for the infrequent stimuli in an auditory attention task and poorer sensory

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processing scores on a behavioural measure. Furthermore, based on previous reports of links between sensory processing and attention control, it is hypothesised that a relation between poorer sensory processing and P3 amplitudes will be observed.
Participants and Methods: Infants with (n=9; mean age= 11.82 months, SD= 2.47) and without (n=41; mean age= 14.22 months, SD= 3.07) a family history of ADHD were recruited. An auditory oddball paradigm was utilised to measure auditory attention and the Test of Sensory Function in Infants was used to measure behavioural sensory reactivity.
Results: In contrast to similar studies with older children who have ADHD and sensory processing difficulties, no significant group differences emerged on the attention and sensory reactivity measures at this early stage of development for infants with and without a family history of ADHD. Correlation analyses revealed no associations between measures.
Conclusions: This pilot study marks an initial attempt at the early examination of neurophysiological and sensory reactivity in infants who are at a higher likelihood of receiving an ADHD diagnosis in childhood. Infants with a family history of ADHD did not differ from those without a family history of ADHD on neurophysiological or behavioural sensory measures. However recruitment challenges may have impacted findings in the current study. The examination of early behavioural and neurophysiological differences in the development of early sensory attention processes during infancy requires further investigation as it could lead to the future development of targeted interventions. In light of the challenges encountered in the present study, recommendations for future research with infant populations will be discussed.

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02 Can the NIH Toolbox Executive Function Tests be Used to Diagnose ADHD in Children

Christopher Nicholls[1] , Amber Schaeffer[2]

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Objective: The National Institute of Health Toolbox Cognition Battery (NTCB) includes measures of executive function development including the Flanker Inhibitory Control and Attention Test (Flanker), the Dimensional Change Card Sort Test (DCCS) and the List Sorting Test. Attention-Deficit/Hyperactivity Disorder (ADHD) has come to be conceptualized as reflecting developmental impairments in executive functioning skills, and is often evaluated by commercially available measures such as the Test of Variables of Attention (TOVA) and the Cognitive Assessment System, Second Edition (CAS2). One behavioral index of ADHD is the Behavior Assessment System for Children, Third Edition (BASC3), ADHD Probability index. According to the BASC3 manual, this index provides an indication of the similarity between parental behavioral ratings of a child, and the ratings of children identified as having ADHD within the standardization sample. We questioned whether there is a significant relationship between scores on the NTCB executive function subtests and the TOVA, CAS and the ADHD Probability Index, in an independent sample of children diagnosed with ADHD.

Participants and Methods: 143 ADHD youth between the ages of 4 and 19 (60.8% boys, 39.2% girls) were administered the NCTB as a part of a more comprehensive evaluation. Correlations were calculated between the Flanker, DCCS and List Sorting demographically adjusted standard scores, and the 1) BASC3 ADHD Probability index standard score, 2) Response Time Variability, Commission and Omission standard scores from the TOVA, and 3) Planning and Attention Composite Index standard scores from the CAS2.

Results: We found that the NTCB executive function tests correlated strongly with each other, consistent with previous findings. In contrast, none of the NTCB scores correlated significantly with the BASC Attention Problems index. Additionally, neither the Flanker Inhibitory Control test nor the DCCS test correlated significantly with any of the TOVA scores or either of the Planning or Attention composite scores of the CAS. We did find that the NTCB List Sorting Test correlated significantly with the TOVA Response Time Variability and the Commission error scores, but not with TOVA Omission or either CAS2 composite scores.

Conclusions: Standardized measures of emerging executive function skills are important in targeting areas of needed intervention, however the scores on the NTCB executive function tests were not found to be associated with independent measures of the purported neuropsychological skills involved in executive functions, or one behavioral index of ADHD, as measured by three commercially available instruments. The assessment of executive

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function and dysfunction therefore requires further study as to the construct validity of various assessment tools, and the interplay of mediating factors.

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03 ADHD During Perimenopause and Menopause

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Objective: There is little data regarding the impact of hormonal changes during menopause on ADHD and associated symptoms. This study examines this issue.
Participants and Methods: Respondents (n= 2001) to a survey regarding ADHD and comorbid symptoms during the menopausal period, published in Additude Magazine, a periodical which disseminates scientific information about ADHD to the public. 98% were women, 92% were between the ages of 40-70, and 76% had been diagnosed with ADHD. Data were clustered into five age groups: 0-9 years, 10-19 years, 20-39 years, 40-59 years and 60+years
Results: *Age of Diagnosis*: Analysis revealed that 65% of the respondents were first diagnosed well into adulthood (i.e., between ages 31-60), with the largest group diagnosed between ages 41-50 (32%). Thus, in this sample the first diagnosis of ADHD was common in adulthood and peaked in the perimenopausal years.
Changes in ADHD Symptoms: Inattention, disorganization, poor time-management, emotional dysregulation, procrastination, impulsivity and poor memory/brain fog increased over life. Of these, the prevalence of inattention, poor memory/"'brain fog" and a general sense of 'overwhelm' increased most markedly in the critical menopausal/perimenopausal window of ages 40-59 (i.e., shifted from 35% to 59%, from 50% to 70%, and from 23% to 70%, for ages 20-39 to ages 40-59, respectively). The majority of respondents (i.e., 1048 or 53% of the sample) also reported that ADHD had the greatest impact in their daily life between 40 to 59 years. Complaints about significant hyperactivity, social struggles and perfectionism remained fairly constant over the life, and were not among the most common complaints (i.e., only endorsed by 25% to 35% of the sample). Thus, ADHD was most disruptive during the perimenopausal/menopausal window of time. In addition, many symptoms of ADHD, and the comorbid emotional and cognitive symptoms worsened over the lifespan. This shift was most pronounced for symptoms of inattention, poor memory/brain fog and 'feeling overwhelmed.'
Comorbid Symptoms: Anxiety and depression were most common (73% and 63%, respectively) consistent with the literature. Also elevated, but much less frequent here, were learning, eating and sensory processing disorders (i.e., 12%-13% each). Thus, depression and anxiety may be the most frequent correlates of an ADHD diagnosis, irrespective of age of onset. Given that data indicates that these problems are very common in children with ADHD, these issues may be less common in those first diagnosed during adulthood.
Conclusions: Hormonal change during the climacteric is associated with cognitive and socioemotional complaints many of which become worse with age. Our results suggest that the increased complaints can lead to a first diagnosis of ADHD during this period, as well as a worsening of symptoms in those previously diagnosed. Moreover, this hormonal shift may underlie this diagnosis in a subset of the individuals currently characterized as having adult-onset ADHD.

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04 Use of tDCS in Adult Patients with ADHD for the Improvement of Executive Functions and Emotional Regulation

Laura Steen García[1] , Rosa Franco Jiménez[1] , Joaquín A. Ibánez Alfonso[1]

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Objective: Currently there is a prevalence of ADHD of 4% in the general population and little awareness of it in adults. It is usually associated with problems in executive functions, attention, and emotional regulation. In addition to the pharmacological treatment and cognitive stimulation that is usually offered, there are now evidences that the intervention can be enhanced through the use of tDCS and other neuromodulation techniques. Non-invasive brain stimulation treatments such as tDCS would compensate for the cognitive deficit established for ADHD by directly stimulating cortical neurons, thus promoting neuroplasticity and enabling long-term outcomes.

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Due to the lack of reviews on this topic, our objective was to carry out a systematic review on the evidence available on the dual application of tDCS together with cognitive stimulation activities in the treatment of adults with ADHD in relation to attention, executive functions and emotional regulation.
Participants and Methods: A systematic review process was performed following PRISMA guidelines. A bibliographic search was carried out through "Web of Science" and "Pubmed" databases using the following search equations: ((tdcs OR "transcranial direct current stimulation") AND (adhd OR attention* OR impulsivity OR hyperactivity OR emotion* OR motivation) AND adult*). A total of 1,046 articles were obtained, of which 12 articles were finally selected.
Results: Most of the articles reviewed have focused on stimulation at the prefrontal level and striatal circuits for attention and executive functions with cathode placement in areas such as the left dorsolateral prefrontal cortex DLPFC (F3) or left orbitofrontal cortex, and anode in the right DLPFC (F4) or inferior frontal gyrus (as the crossing point between T4-Fz and F8-Cz). For emotional regulation, no studies were found that explicitly studied emotional regulation in adult ADHD, but in other studies the electrodes were placed in different places, the anode has been placed in the left or right dorsolateral prefrontal cortex DLPFC (F3 y F4) and the cathode in the right supraorbital area (Fp2) and right motor cortex (C4). They have also shown significant evidence of improvement in ADHD symptoms in terms of attention, emotional regulation and executive functions, highlighting inhibitory control, working memory and processing speed.
Conclusions: Although few studies were found regarding symptomatologic treatment of ADHD by tDCS in adult population, the available scientific evidence suggests that the most convenient setting for the neuromodulation of adults with ADHD would be to perform 10 sessions of 20 minutes in a dual way with cognitive stimulation activities and tDCS in different combinations of the anode and the cathode depending on the main functions to stimulate: sustained attention, inhibition control, or emotional regulation. The benefits and evidence found are quite significant, in addition to the fact that tDCS is a non-invasive stimulation technique and rarely has mild side effects compared to pharmacological treatment. Although further research about tDCS as a dual treatment in ADHD is needed, the long term improvements in attention, emotional regulation and inhibition that have been found seem promising to improve current treatments and quality of life of adults with ADHD.

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05 Modulation of a Concurrent Visual Working Memory Task in Visual Search: a Neurodevelopmental Perspective

Maria Quiros-Godoy[1] , Beatriz Gil-Gomez de Liano[1] , Elena Perez-Hernandez[1]

[1]University Autonoma of Madrid

Objective: Visual Search (VS) tasks are daily activities in children, especially in educational contexts. From searching for a missing color for drawing in kindergarten to solving complex math problems in elementary or middle school. Children often perform these tasks while maintaining non-VS-task-related information in working memory too. However, the potential interaction of working memory and cognitive processes in visual search tasks remains unclear in adulthood. Importantly, as far as we know, there are no experimental studies in children testing the possible interaction between VS and Visual Working Memory (VWM).
The objective of this work was to study how the load of a visual WM (VWM) task could interact with the VS performance of children from Kindergarten to College, in terms of latency, accuracy, and efficiency, based on the Developmental Model of Endogenous Mental Attention (Pascual-Leone & Johnson, 1999, 2005, 2021).
Participants and Methods: The sample was composed of 147 participants divided into five groups at different educational levels (Kindergarten, 2nd and 4th Elementary school, 6th Middle school, and College students). Participants performed both the VWM and VS tasks concurrently. In each session, the load on the VWM task changed from remembering 1 to 4 items (thus, creating two conditions: low and high load). We employed the Pirate-Treasure VS paradigm (Gil-Gómez de Liaño et al., 2020).
Results: Our findings showed that efficiency in VS was not affected by the load of the VWM task at any educational level, replicating previous results with adults. However, although the youngest children could perform the task efficiently regardless of the VWM load, they spent more time in the high load condition. Interestingly, we found an increase in the probability of committing false alarms and commissions when the memory was highly loaded, regardless of the participant's age.
Conclusions: Our study highlights the need to adapt VS tasks in the educational context, considering the stage of development.

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Paper Session 11: Cultural and social aspects influencing neuropsychological assessment

14:00-14:50h
Thursday, July 7, 2022

01 Does native language impact the assessment of the executive abilities ?

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Objective: The number of years of education, similar to the native language, influences performance on neuropsychological tests such as inhibition and mental flexibility assessment. The assessment of inhibition and mental flexibility is a cornerstone to predict the conversion of MCI patients to Alzheimer's disease. However, the evaluation of inhibition and mental flexibility is made difficult or is biased in immigrant populations who often do not share the same native language as the psychologist and have a low level of literacy. Our study compares the inhibition and mental flexibility performances in three groups of participants: 1) a group of Arabic immigrant patients living in France suffering from a neurodegenerative disease, 2) a group of healthy Arabic participants living in Maghreb and 3) a group of healthy French participants living in France.
Participants and Methods: Our three groups consisted of 12 individuals matched for age, low education, and gender distribution. Each participant performed the Five Digit Test (FDT) which proposes four 50-dominoe boards. In the first board (B1), the dominoes are made up of digits and the participants must read them. In the second board (B2), the dominoes are composed of stars and the participants must count them. In the third board (B3), the dominoes are made up of digits and participants must count how many digits there are on each domino, requiring to inhibit the digit reading. In the last board (B4), participants have to perform similarly to B3, but some dominoes are highlighted indicating they have to switch and read the digit instead of counting them. Time and errors for each board are measured.
Results: The first analysis compares the inhibition and mental flexibility performances of Arabic patients to the performances of Arabic healthy participants living in Maghreb. The performance of the two groups differed in errors for B3 ($p<0.02$) and B4 ($p<0.016$) as well as the time taken for the first three boards (B1: $p=0.03$, B2: $p=0.014$ and B3: $p=0.09$). The patients produced more errors and were slower. For B4, both groups of participants had similar processing speed but patients produced more errors.
The second analysis compares the inhibition and mental flexibility performances of Arabic patients to the performances of French healthy participants, the same results are obtained (i.e., more errors for patients in B3 ($p=0.04$) and B4 ($p<0.01$) and a slowdown for boards B1, B2 and B3 ($p<0.004$, $p=0.01$, $p=0.009$)). For the B4 board, both groups of participants are slower but the patients make more errors.
Conclusion: The inhibition and mental flexibility of patients with neurodegenerative disease assessed with the FDT is not impacted by the fact that the test is performed in the patients' non-native language. These results clearly show the value of the FDT for a cross-cultural neuropsychological assessment in executive functions.

02 Developing a Culture-Sensitive Survey on Attitudes Towards Neuropsychological Assessment: A Literature Review

Maria Pleshkevich[1] , Kyle Pellerin[2] , Inmaculada Ibanez-Casas[2] , Zara Melikyan[3]

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Objective*:* Patient attitudes towards neuropsychological assessment affect its validity and reliability (Martin et al., 2015). Understanding diverse perspectives on cognitive assessment is important in an increasingly multicultural patient pool. While existing surveys examine attitudes towards specific conditions, no questionnaire assesses attitudes

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towards testing across illnesses in a culture-sensitive way. The present study presents the procedures and results of an exhaustive literature review of scales on attitudes towards cognitive testing. This review will serve as the basis for developing a culturally-sensitive questionnaire on attitudes towards neuropsychological assessment (ATNA).
Participants and Methods: We performed a literature search in Web of Science, PsychINFO, Medline, Pubmed, and Google Scholar with no limit in time of publication. We searched for articles on patient and expert attitudes towards (neuro)psychological assessment using combinations of the following search items: neuropsychological, neuropsych*, psychological, psych*, assessment, testing, evaluation, cross-cultural, cultur*, perception, attitudes, survey, questionnaire. Articles were independently selected by two reviewers (KP and MP). We included papers examining expert or patient attitudes towards testing including only unique instruments. We did not include articles discussing attitudes towards specific neurocognitive conditions or those comparing only cross-cultural neuropsychological outcomes without explicitly addressing attitudes towards testing.
Results: Using different combinations of the terms specified above, we identified a total of 1,478 papers. Of these, 15 met our inclusion criteria. Ten additional papers were added based on a literature review that was identified in the original search (Martin et al., 2015). Thus, we included 25 papers in our analyses. For descriptive purposes, we grouped these 25 papers based on their data collection method and population focus. Our examination of these groups showed that in the identified papers, attitudes were evaluated via structured interviews or focus groups (n=8, 32%), or via surveys (n=17, 68%). Of these same 25 papers, 11 (44%) focused on practitioner attitudes, 13 (52%) on patient attitudes, and 1 (4%) developed a measure for both. Additionally, we explored the neurological and multicultural focuses of the 26 identified papers examined. Only 7 (28%) of the 26 papers addressed cross-cultural attitudes. A majority of papers focused on cognitive aging (n=15, 60%). In the reviewed papers, common themes were practitioner concerns of test limitations (such as cross-cultural biases) and patient concerns of testing outcomes and related stigma.
Conclusions*:* We could not identify a scale developed through a multicultural lens that generalizes across neurocognitive conditions. Moreover, out of 1,478 papers, only 25 identified relevant measures to the development of ATNA. Given the importance of understanding cross-cultural attitudes towards testing for assessing performance validity, there is an unmet scientific need for such a scale. This literature review provides us with the needed information to make ATNA a scientifically sound instrument to assess attitudes towards neuropsychological testing cross-culturally.

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03 The Association of Sociodemographic Factors with Total and Item-Level Semantic Fluency Metrics

Magdalena Beran[1,2] , Emma L. Twait[1] , Annelot P. Smit[1,3] , Marleen Posthuma[4] , Demi van Dijk[4] , Katherinne M. Rabanal[5] , Dayanara Rosado[5] , Roxanna J. Flores[5] , Carolyn L. Qian[5] , Shana Samuel[5] , Gelan Ying[5] , Richard Mayeux[5,6,7] , Nicole Schupf[5,6,7] , Thomas T. van Sloten[2] , Miranda T. Schram[2,8] , Jennifer J. Manly[5,6,7] , Mirjam I. Geerlings[1] , Jet M.J. Vonk[1,5,6]

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Objective: The semantic fluency task is a sensitive measure of cognitive performance. In this task, individuals generate as many items as possible from a certain category within a given time frame. Performance measured by the total number of correct words partly depends on sociodemographic variables, including age and education. Recent studies propose using item-level metrics of this task as additional cognitive metrics. These item-level metrics of semantic fluency might be differentially associated with

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age, sex/gender, and education than the traditional metric total number of words. This study aimed to: (I) assess the associations of sociodemographic factors with total score on semantic fluency, (II) assess associations of sociodemographic factors and item-level metrics, and how these potentially differ from associations in aim I, and (III) compare findings of these analyses across three cohorts from different settings with different recruitment strategies.

Participants and Methods: Cross-sectional data were used from three cohorts: Washington Heights-Hamilton Heights-Inwood Community Aging Project (WHICAP), a community-based study from the US (n=672) including English (n=624; WHICAP-English) and Spanish speakers (n=48; WHICAP-Spanish); Second Manifestations of ARTerial diseases Magnetic Resonance Study (SMART-MR), a hospital-based cohort study from the University Medical Center Utrecht in the Netherlands (n=718); and the African American Alzheimer's Disease Genetics (AAG) study, a volunteer-based cohort from the US (n=1056). Total number of correct words and six item-level metrics (lexical/Zipf-frequency, age of acquisition, lexical decision response time, average cluster size, number of cluster-switches) were included as main outcomes. Multivariate structural equation modeling was performed separately in each cohort to model the association between sociodemographic variables and semantic fluency metrics, comparing total scores to item-level metrics by use of a z-test. For the meta-analytic comparison, the coefficients were pooled across cohorts using a weighted least squares approach.

Results: Across all three cohorts, older age was associated with a lower total score, fewer cluster switches, and naming words with a lower age of acquisition. Higher level of education was associated with naming words with a longer (SMART-MR) or shorter (WHICAP-English) lexical decision response time, words with a lower (WHICAP-English) or higher (SMART-MR) frequency of occurrence in daily life, or words acquired later in life in WHICAP-English and SMART-MR, but not in WHICAP-Spanish or AAG. In AAG and SMART-MR, women had smaller cluster sizes, named words with a lower frequency of occurrence and words with a lower age of acquisition compared to men. In WHICAP among Spanish speakers, women produced words with a higher age of acquisition than men. Coefficients for age were different for total number of words compared to item-level metrics across all cohorts except WHICAP-Spanish, and in SMART-MR and AAG for sex/gender and education.

Conclusion: We found discrepancies among associations of age, sex, and education level with item level semantic fluency metrics task across three independent cohorts from different settings with different sample characteristic compositions. Overall, the results highlight the importance of thoroughly considering the demographics of a study's sample in semantic fluency test interpretation based on the sample distribution.

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04 Diagnostic Accuracy of Performance Validity Tests in Indonesia: Simulation Study in Undergraduate Students

Widhi Adhiatma[1,2] , Marc P. H. Hendriks[2,4] , Magdalena S. Halim[1] , Roy P. C. Kessels[2,3]

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Objective: Currently, there are no well validated tests for symptom validity testing in Indonesia. This prospective study aimed to examine the diagnostic accuracy of four Performance Validity Tests (PVTs) in Indonesia, namely: the Non-Verbal Medical Symptom Validity Test (NV-MSVT), Tes Memori Jangka Pendek Indonesia (TMJPI), (an Indonesian adapted version of the Amsterdam Short Term Memory [ASTM]), the Reliable Digit Span (RDS) test, and the Longest Digits Forward – 1 Trial (LDF-1), from the Digit Span subtest of the Indonesian version of the WAIS-IV.

Participants and Methods: 317 Healthy participants (i.e., undergraduate students) were included. All participants were recruited using convenience sampling and randomly assigned to each group. The simulation employed a person who feigned a mild TBI to avoid a lawsuit. Participants were divided into three groups: (1) Experimental Group 1 (EG1, n=103), was asked to simulate a mild TBI and instructed that if the test revealed their feigning, the lawsuit would be weighed, (2) Experimental Group 2 (EG2, n=106); as in EG1 but they were instructed to be less obvious in feigning while performing the

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tests, and (3) a Control Group (n=108), that was instructed to complete the tests with their best effort. We used minimum specificity level of 0.90 to determine the optimum cut-off.
Results: The analyses showed that the NV-MSVT Criterion A1 had an AUC .962 (SE_{AUC} = .009; 95% CI = [.944, .980]), Sensitivity = .842, Specificity = .926. NV-MSVT Criterion A2 had an AUC .952 (SE_{AUC} = .012; 95% CI = [.929, .974]), Sensitivity = .813, Specificity = .926. TMJPI had an AUC .972 (SE_{AUC} = .009; 95% CI = [.954, .990]), Sensitivity = .871, Specificity = .991. RDS had an AUC .947 (SE_{AUC} = .012; 95% CI = [.924, .970]), Sensitivity = .880, Specificity = .917. LDF-1 had an AUC .913 (SE_{AUC} = .016; 95% CI = [.882, .945]), Sensitivity = .679, Specificity = .935.
Conclusions: In conclusion, all tests indicate a high accuracy in differentiating between valid and invalid performance in healthy participants. Further study is needed to examine these tests' diagnostic accuracy in clinical samples, so this test will finally be available to be used in the clinical setting.

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05 Assessing Social Cognition in Virtual Reality: Feasibility and Interest of REALSoCog in Pathology

Eva-Flore Msika[1] , Nathalie Ehrlé[1,2] , Marc Verny[3] , Bénédicte Dieudonné[3] , Alexandre Gaston-Bellegarde[1] , Eric Orriols[1] , Pascale Piolino[1] , Pauline Narme[1]

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Objective: It is now established that social cognition disturbances are frequently observed in neurology and contribute to the development of social behavior disorders. However, the evaluation of social cognition disturbances remains limited. A new virtual reality task, REALSoCog, has been developed to help identify maladjusted social behaviors in daily life, which are not always observed in consultation but are reported by caregivers. REALSoCog allows a composite and objective measurement of the different socio-cognitive processes, assessing within the same task, Theory of Mind (ToM), empathic concern, moral cognition and social behaviors through action intentions. Moral cognition is often neglected in social cognition tests, yet it is an ideal opportunity for studying the integrated functioning of high-level social-cognitive processes as it is a cognitively non-unified concept. Furthermore, there is little available data in pathology regarding this process, particularly in Alzheimer's disease (AD) and dementia with Lewy bodies (LBD). Therefore, this study aims to test the feasibility of the REALSoCog and document these abilities, including moral cognition, for AD and LBD pathologies.
Participants and Methods: Participants navigated in a virtual city, encountering concrete and close to real life social situations, that they had to judge as appropriate or inappropriate. The inappropriate situations involved transgressions (moral or conventional) that could elicit empathy. For each situation, several questions assessed the ability to detect the appropriateness or inappropriateness of the situations (moral cognition capacities), ToM (cognitive and affective), empathic concern, and the propensity to act. A pilot study was conducted in 7 LBD patients (86.1 ± 4.9 years), 9 AD patients (83.0 ± 7.7 years) and 38 elderly control subjects (73.8 ± 5.9 years).
Results: Intergroup Mann-Whitney and intragroup Wilcoxon analyses revealed in LBD (i) a decline in moral cognition and cognitive TDE abilities, (i) an incongruence between the emotion felt and that attributed to others, (ii) a sharp increase in the propensity to act inappropriately. In AD, the results highlight (i) an overvaluation of inappropriate situations, (ii) incongruent emotions with the situation, (iii) an increased propensity to act inappropriately but (iv) a maintenance of TDE abilities.

Conclusion: This study suggests that REALSoCog allows (i) to objectively highlight social-cognitive disturbances in AD and LBD patients, (ii) to replicate some declines reported in the literature [1-3] and (iii) to specify impairments for processes that have been little investigated until now, thanks to a playful and interactive tool. This new test seems to be able to account for indices of early socio-cognitive and socio-behavioral dysfunction in these diseases. The measurement of the propensity to act seems to be a particularly relevant indicator, not measured by classical tools.
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Paper Session 12: The role of cognitive, subjective and biological factors in TBI

14:00-14:50h
Thursday, July 7, 2022

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01 Client Experiences with Holistic Neuropsychological Rehabilitation: 'it is an Ongoing Process'

Anne-Fleur Domensino[1,2] , Daan Verberne[1,2] , Leyla Prince[3] , Jessica Fish[4] , Jill Winegardner[5] , Andrew Bateman[6] , Barbara Wilson[3] , Rudolf Ponds[1,2] , Caroline van Heugten[1,2,7]

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Objective: Acquired brain injury (ABI) leads to long-term consequences in a variety of life domains, potentially reducing quality of life. Given the complex interaction between these consequences, patients may benefit from a holistic neuropsychological approach to rehabilitation, especially in the long term after the injury. The effectiveness of holistic neuropsychological rehabilitation for people with acquired brain injury has previously been demonstrated by means of standardized and routinely administered outcome measures. However, the most important outcomes from the perspective of former clients are largely unknown.
Participants and Methods: This study explored the experience of participating in a holistic neuropsychological rehabilitation programme by conducting three focus groups with twelve former clients who had sustained a brain injury. All participants of each focus group originated from separate clinical cohorts and had completed the programme 1–5 years before participating. Data were transcribed verbatim and analysed using thematic analysis. Multiple coders were used to identify themes and subthemes.
Results: The analysis revealed a metatheme, of "*It is an ongoing process*", reflected by the fact that overcoming a brain injury is an ongoing process which is facilitated by, but not limited to the time spent in rehabilitation. Four subthemes, or phases, were identified. Participants first went through a phase of confrontation as a result of the assessments at the commencement of the programme, which resulted in an increased awareness of their injuries. Consequently, the confrontation with their disability made some participants question themselves, leading to a decrease in self-esteem. In the second phase, participants learned about their strengths and weaknesses which improved their self-esteem. Furthermore, they acquired compensatory skills and strategies to compensate for the capacitates they had lost as a result of the brain injury, leading to an increased sense of competence. In the third phase, participants experimented with the newly acquired skills and strategies in daily life. Participants described this phase as testing and often failing, leading to a temporary decrease of self-esteem and sense of competence. The last phase represented coming to terms. As the strategies transferred to daily life, participants reported feeling better equipped to adapt to life events. A number of environmental factors (governmental systems and insurance, knowledge on ABI in general healthcare, support by family and friends, and public awareness) were said to have an influence on overcoming the consequences of a brain injury in general, and participating in rehabilitation specifically.
Conclusions: Our results indicate that holistic neuropsychological rehabilitation is considered effective by former clients. Contrasting with traditional views on recovery, participants did not consider an improvement in functioning the most important outcome of the programme and even stressed the fact that most (cognitive) problems are still present. Instead, participants regarded increased levels of self-esteem, sense of competence, and adaptation as the most

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important outcomes of the programme, as these factors helped them regain a sense of identity. Including these factors in outcome evaluations of complex interventions after brain injury may be important, as the essence of change may be in transcending psychological factors, rather than functional outcome alone.

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02 Accelerated Long-Term Forgetting in Patients After Acquired Brain Injury

Martina Studer[1] , Dörthe Heinemann[1] , Klemens Gutbrod[2] , Katharina Henke[3] , Adrian Guggisberg[1]

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Objective: Accelerated long-term forgetting (ALF) is defined as a normal recall after a brief and an impaired recall after a long study-test interval. ALF appears to originate in a deficient consolidation. Most studies of ALF included only patients with epilepsy. Because recent evidence suggests that ALF is not epilepsy specific, we investigated ALF in patients with acquired brain injuries (ABI) as they often suffer memory impairments. We hypothesized that the delayed verbal memory recall would be related to executive functions and prefrontal cortex functions.
Participants and Methods: In this retrospective study, we included data of 38 German-speaking ABI patients (traumatic brain injury (n=11), stroke (n=11), hemorrhage (n=6), inflammation (n=4), brain tumour (n=5), epilepsy (n=1)) visiting neuro-rehabilitation (age: M=42.4 (SD=15.4), years of education: M=13.4 (2.4), gender: 45% female). Inclusion criteria were an average 30-min memory recall and a relevant verbal recall 1-week after learning. Patients were tested about 40 days (SD=24) after their ABI. Data from healthy controls stems from an ongoing standardization study of delayed memory performance at 1-week following learning. We included 192 healthy German-speaking adults (age: M=40.6 (SD=16.3), years of education: M=14.3 (2.4), gender: 63% female); inclusion criteria were no depression, no previous psychological or neurological diagnosis, and an average 30-min verbal memory recall. We compared the verbal memory recall at 30-min and 1-week following learning (German version of the RALVT) taking into account executive functions (working memory (digit span backward); letter fluency (S-Words)) including ABI patients and controls in an ANCOVA (controlling for years of education and learning efficiency). Furthermore, we analyzed group specific Pearson correlations between the 1-week verbal recall and executive functions. Additionally, we calculated z-scores for the 1-week recall using age-specific mean and SD values derived from the controls; z-scores >-1.5 SD were interpreted as ALF.
Results: While the verbal recall immediately and 30-minutes after learning was not statistically different between patients and controls, the patients' verbal recall was significantly smaller than the controls' at 1 week following learning evincing ALF (patients: M=6.4 words (SD=2.8); controls: M=9.4 words (SD=3.5); F (1,226)=15.97, p<.001, η^2 =.07). There was no group difference regarding working memory performance. However, patients exhibited a significantly reduced verbal fluency compared to controls (patients: M=20.2 words (SD=8.2), controls: M=31.1 (SD=8.4); F (1,225)=46.32, p<.001, η^2=.17). Those patients exhibiting a bad verbal fluency showed also a clear long-term forgetting (r=.42, p<.01). Eight patients (21%) exhibited a clinically relevant ALF, which would have been missed by using standardized memory test.
Conclusion: ALF occurs in patients with ABI of various origins and is missed by standardized memory tests. The prefrontal cortex may underlie the accelerated long-term forgetting because it plays a critical role in the long-term systems consolidation, where hippocampal-dependent memories become neocortically implemented. Future studies might investigate functional networks underlying encoding and the recall of delayed memories.

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03 Attention to Attention in Aphasia – Capturing Compromised Components and Contributing Correlates

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Objective: Attention, our ability to detect, select, and react to the abundance of stimuli present in the environment, is fundamental for nearly all our activities. Attentional impairments are a common consequence of brain lesions but most of the patient-related research on attention

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focused on patients with right hemisphere lesions and impairments in (visuo)spatial attention allocation. Patients with left hemisphere lesions often have difficulties in language processing – aphasia – and are therefore usually excluded from studies on other cognitive functions. The few studies investigating attentional performance in aphasia often considered only one specific task, stimulus modality, or type of measure and usually only group-level analyses or data based on experimental tasks were presented.
We report detailed analyses on a rich dataset including patients' performance on various subtests of two well-known, standardised neuropsychological test batteries assessing attention. We aimed at elucidating aspects of attentional performance in patients with chronic post stroke aphasia, in particular: 1) how many patients show impaired performance in comparison to normative data, in which tasks and on what measure; 2) how the different tasks and measures relate to each other and to patients' language abilities; 3) the neural correlates associated with attentional performance.
Participants and Methods:
Up to 32 patients with varying aphasia severity were assessed with subtests from the Test of Attentional Performance (TAP) as well as the Test of Everyday Attention (TEA). Performance was compared to normative data, relationships between attention measures and other background data were explored with principal component analyses and correlations, and brain-behaviour relationships were assessed by means of voxel-based correlational methodology.
Results: Depending on the task and measure, between 3 and 54 percent of the patients showed an impaired performance level compared to normative data. The highest proportion of impaired performance was noted for complex attention tasks involving auditory stimuli. Patients differed in their patterns of performance and only the performance in the divided attention tests was (weakly) associated with their overall language impairment. Principal components analyses yielded four underlying factors, each being associated with distinct neural correlates.
Conclusions: We thus extend previous research in characterizing different aspects of attentional performance within one sample of patients with chronic post stroke aphasia. Performance in a broad range of attention tasks and measures was variable and largely independent of patients' language abilities, which underlines the importance of assessing this cognitive domain in patients with left-hemisphere lesions. Notably, a considerable proportion of patients showed difficulties with attention allocation to auditory stimuli. The reasons for these potentially modality-specific difficulties are currently not well understood and warrant additional investigations, also to further elucidate the observed association with patients' language impairments.

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04 Mild Traumatic Brain Injury and Cognitive, Health and Emotional Symptoms in Gulf War Illness

Maxine Krengel[1,2] , Kathryn Price[2] , Leah Orlinsky Orlinsky [2] , Peter Rivoira[2] , Clara Zundel[4] , Kimberly Sullivan[3]

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[2]VA Boston Healthcare System
[3]Boston University School of Public Healthc
[4]Wayne University

Objective: It has been documented that neurotoxicant exposures at the time of the Gulf War (GW) are the cause of GW Illness (GWI), a chronic multisymptom illness with central nervous system involvement. However, in a longitudinal study of GW veterans it was found that mild traumatic brain injury (mTBI) has also contributed to health symptoms. In cross-sectional studies, during three separate time points within one cohort, we found that deployed veterans with mTBI during the war have higher rates of health symptoms than those without such events. We also found that with increased number of mTBI sustained, veterans showed an increased number of symptom complaints. While these studies were cross-sectional by design, this limits the ability to understand the trajectory of symptoms within individuals or change in symptoms over time. Additionally, mTBI and neurotoxicant exposures have similar neuropsychological sequalae and health impacts (e.g., trouble concentrating, increased mood complaints). Thus, it is important to document which health symptoms may be related to mTBI, in addition to neurotoxicant exposures, within the GW veteran population. The present study investigates how a mTBI sustained during the war changes individual symptom trajectories (collected over 25 years) in GW veterans.
Participants and Methods: Veterans were originally recruited from those who returned from deployment through Ft. Devens, Massachusetts and were seen within one week of their return (1991). These individuals were followed over 25 years, as part of the Ft. Devens Survey Cohort (FDC) with 3 separate surveys

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administered in 1992, 1997-1998 and 2013-2017. Surveys included questions pertaining to health symptoms, history of traumatic brain injury, and mood and anxiety related disorders. Veterans were categorized into 5 a priori trajectory groups for each health symptom: reported the symptom at all time points, reported the symptom initially but recovered, mixed reporting of the symptom, did not report the symptom initially but developed it over time, and never reported the symptom. Multinomial logistic regression models were used to investigate associations between these trajectories and mTBI during the war.
Results: Results indicated that mTBI during the war accounted for late occurring, or the development of, multiple cognitive and mood symptoms. In fact, those with mTBI were over four times as likely to develop trouble with concentration, five times more likely to develop fatigue and nine times more likely to develop nervousness over time, as compared to veterans who did not report sustaining a mTBI during deployment. Consistent symptoms reported by veterans with mTBI over all three timepoints included upset stomach or nausea.
Conclusion: This study highlights the importance of documenting mTBI in addition to neurotoxicant exposures at the time of the GW when evaluating the lasting health impacts experienced by GW veterans. Future studies should assess a double-hit model, investigating symptom trajectories of veterans who experienced both a mTBI and neurotoxicant exposures during the war. By identifying health outcomes attributed to either experience (i.e., mTBI, neurotoxicant exposures), symptom-specific treatments may be developed and applied to better address the continued health care needs of the veterans.

Paper Session 13: Stroke: cognitive and emotional consequences

14:00-14:50h
Thursday, July 7, 2022

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01 Theta Oscillatory Activity Relating to Inhibitory Control Effort in Post-Stroke Children

Prisca Hsu[1,2] , Cecilia Jobst[2] , Nomazulu Dlamini[1,3,4] , Douglas Cheyne[1,2,5]

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[5]Institute of Biomedical Engineering, University of Toronto
[6]Department of Medical Imaging, University of Toronto

Objective: One in five children with an arterial ischemic stroke (AIS) will develop dystonia, a painful and disabling movement disorder characterized by repetitive muscle contractions, twisting movements, and abnormal posture. Interestingly, cognitive impairments such as reduced executive function are more likely to develop in post-stroke children with dystonia than those without. An emerging hypothesis linking dystonia and cognitive impairments involves deficits in inhibitory control, an ability related to planning goal-directed behaviors and inhibiting habitual responses.
Participants and Methods: Three post-stroke dystonia patients, three non-dystonia post-stroke patients, and eight age- and sex-matched healthy children (ages 8-17 years) completed the go/no-go paradigm: pressing a button at “go” cues and withholding movement at “no-go” cues. By combining functional MEG and structural MRI, transient increases in theta (4-8 Hz) power originating from the right medial frontal cortex were especially apparent during ‘no-go’ cues.
Results: Dystonia patients showed overall higher theta power increases in both their affected and unaffected hands compared to their counterparts without dystonia, suggesting a global impairment in inhibitory control. Furthermore, dystonia patients exhibited more variable and longer reaction times, and higher error rates in their dystonic hand compared to their unaffected hand and their counterparts without dystonia. Interestingly, non-dystonia patients did not show any behavioral differences across both hands, but theta power was greater in the hand associated with the lesioned hemisphere, suggesting higher effort to maintain effective inhibitory control. Healthy control exhibited lower theta power, more consistent and lower reaction times, and more accurate responses compared to both patient groups.
Conclusion: Together, these preliminary results suggest that neural theta oscillatory activity may be indicative of inhibitory control effort, but not reflective of its effectiveness in selecting correct movements. These findings will be an important step towards understanding the neural correlates that underly different outcomes following pediatric stroke.

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02 Negative Reward Captures Attention in the same way as Task-Relevance: a Study of Spatial Neglect

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Objective: Though motivational value is a well-known driver of approach and avoidance behavior, less is known about the potential of reward to capture attention. We here explored the characteristic deficit of patients with left spatial neglect to disengage attention from an ipsilesional distracter. We based our study on recent observations showing that the disengagement deficit – a failure to shift attention contralesionally following an ipsilesional distracter - is exaggerated for distracters with target-defining features, indicating that task-relevance captures attention.
Participants and Methods: Eleven patients with a first right hemispheric stroke and signs of visuo-spatial neglect, as well as a matched group of healthy subjects were included in this study. We used a spatial cueing paradigm to test the interaction between motivational value and task-relevance. Participants reacted to colored targets shown in the visual periphery, preceded by lateralized cues. Crucially, cues were either neutral, associated with positive/negative reward, or task-relevant (i.e., shared the target-defining color). The experimental conditions were target position (left, right), cue validity (valid, invalid) and cue type (neutral, positive, negative, relevant).
Results: Controls reacted faster after valid than invalid cues, but there was no effect of target position or cue type. Patients showed the expected contralateral slowing of reaction time for contralesional targets. In addition, there was a significant interaction between target position, validity and cue type. Critically, the disengagement deficit (interaction target position x validity) was only observed when cues were relevant or associated with a negative reward.
Conclusions: We propose that task-relevance effects affect performance at the level of the priority map, a higher-order representation established in parietal cortex that does not depend on specific perceptual features. The most important finding of our study is that negative reward captures attention in the same way as task-relevance, and by doing so increases the disengagement deficit characterizing spatial neglect. Our findings contribute to a better understanding of the modulatory control of attention by placing motivational value alongside task-relevance as powerful factors affecting attentional selection.

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03 Mental Health Service Access in Australian Survivors of Stroke: Contributing Factors and Long-Term Outcomes

Priscilla Tjokrowijoto[1,2] , Renerus Stolwyk[1,2] , David Ung[3] , Monique Kilkenny[4,5] , Joosup Kim[4,5] , Lachlan Dalli[4] , Dominique Cadilhac[4,5] , Nadine Andrew[3]

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[2]Stroke and Telehealth Research, Monash-Epworth Rehabilitation Research Centre, Richmond, Australia
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[4]Stroke and Ageing Research, School of Clinical Sciences at Monash Health, Monash University, Clayton, Australia
[5]Stroke Division, Florey Institute of Neuroscience and Mental Health, Parkville, Australia

Objective: To investigate factors associated with access to mental health treatment following stroke and impacts on long-term outcomes.
Participant and Methods: Cohort study derived from the Australian Stroke Clinical Registry (Queensland and Victorian registrants: 2012-2016) linked with state and national hospital, primary care, and pharmaceutical data. Registrants who completed the registry's routine 3-6 months follow-up survey were included. Staged multivariable multilevel logistic regressions (adjusting for clustering by health service region) were conducted to identify factors associated with treatment access. Cox proportional hazards regressions were used to assess the association between treatment access and survival and hospital re-presentations (admissions and emergency presentations).

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Results: Among 6842 individuals (42% female, median age 71.31 years), 38% reported depression/anxiety at 3-6 months following stroke. Of these, 54% accessed treatment (92% antidepressant/anxiolytic medication, 31% psychological support). Notable factors associated with access included being female (Odds Ratio (OR) 1.30 [95% CI 1.14, 1.48]), younger age at stroke (OR 0.98 [95% CI 0.97, 0.98]), self-reported depression/anxiety (OR 2.56 [95% CI 2.25, 2.91), more severe stroke (OR 0.85 [95% CI 0.74, 0.97]), haemorrhagic stroke (OR 0.71 [95% CI 0.56, 0.89]), having a chronic disease management plan (OR 1.18 [95% CI 1.03, 1.35]), history of mental health treatment (OR 1.80 [95% CI 1.36, 2.38]) or medication (OR 17.37 [95% CI 14.85, 20.31]), and more primary care visits pre-stroke (OR 1.04 [95% CI 1.03, 1.05]). Those who required interpreter services (OR 0.50 [95% CI 0.26, 0.97), used a concession card (OR 0.74 [95% CI 0.59, 0.92]) or had less regular primary care visits (OR 1.05 [95% CI 1.04, 1.06]) were less likely to access mental health-related services whereas those not born in Australia (OR 0.51 [95% CI 0.29, 0.90]) and with comorbid health conditions (OR 1.06 [95% CI 1.02, 1.10]) were more likely to access medication. Among those who reported depression/anxiety, those who sought mental health treatment had a slightly greater hazard of presenting to hospital (hazard ratio, 1.06 [95% CI, 1.01-1.12]) and there was no difference in survival.
Conclusions: Nearly half of stroke survivors with mood problems are not receiving treatment. Primary care practitioners play an important role in facilitating treatment access. Avenues should be explored to improve access for men, older adults, newly diagnosed and culturally/linguistically diverse individuals, such as through targeted screening and psychoeducation.

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04 Long-Term Social Cognition and Behavior Problems After Subarachnoid Hemorrhage and the Effect on Participation

Lieke Jorna[1] , Sara Khosdelazad[1] , Sandra Rakers[1] , Ralf Koffijberg[2] , Rob Groen[3] , Anne Buunk[1] , Joke Spikman[1]

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Objective: Our aim was to investigate to which extent social cognition deficits and self- and proxy-rated behavioral problems, that were assessed in the subacute stage after subarachnoid hemorrhage (SAH), persist at the long term. We made a distinction between aneurysmal SAH (aSAH) patients and angiographically negative SAH (anSAH) patients. Additionally, we aimed to find out whether social cognition deficits and self- and proxy-rated behavioral problems in the subacute stage after SAH are related to long-term problems in participation.
Participants and Methods: This longitudinal follow-up study included SAH patients who were admitted to the University Medical Center Groningen. Neuropsychological assessments were performed in the subacute stage (3-6 months) after SAH (T1) and again in the chronic stage (2-4 years) after SAH (T2). Emotion recognition was measured using the Ekman 60-Faces test (FEEST), and Theory of Mind (ToM) was measured using the Cartoon Test and the Faux Pas Test. Behavioral problems were quantified using the Apathy Evaluation Scale (AES) and the Dysexecutive Questionnaire (DEX). Of both questionnaires, both a self-rated and proxy-rated version were used. Finally, the Role Resumption List (RRL) was used to assess changes in amount and quality of work, social relations, leisure activities and mobility.
Results: A total of 59 aSAH and 22 anSAH patients were included in this study. At T1, impairments in emotion recognition were present in 28.8% of aSAH patients and 22.7% of anSAH patients (FEEST total < 42). For ToM, 18.6% of aSAH patients and 18.2% of anSAH patients scored below cut-off (< 14) on the Cartoon test. The Faux Pas score was below cut-off (< 8) for 10.2% of aSAH patients and 9.1% of anSAH patients. At T2, a significant improvement was only found for aSAH patients on the Cartoon test. Regarding behavioral problems, only for anSAH patients we found an increase in problems on both the DEX-self and DEX-proxy at T2. Finally, a lower score on the Faux Pas at T1 was related to more problems in social relations at T2 in the total group of SAH patients. Also, a higher score on the DEX-proxy at T1 was related to more problems in resumption of work and social relations at T2 in the total group of SAH patients.
Conclusions: In conclusion, social cognition deficits after SAH, assessed in the subacute stage, seem to persist over time. Interestingly, although performance on almost all social

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cognition tests remains stable, anSAH patients and their relatives reported significantly more behavioral problems over time. Nevertheless, aSAH patients still reported more behavioral problems than anSAH patients in both the subacute and chronic stage after SAH. Moreover, this study is the first to find that ToM and proxy-rated behavioral problems in the subacute stage after SAH are related to problems in participation in the chronic stage after SAH. These findings emphasize the need for increased attention for deficits in social cognition and behavior after SAH due to their long-lasting impact on daily life functioning in this patient group.

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05 Differential Roles of Objective and Subjective Cognition to Depression and Activity Levels in Chronic Stroke

Andrea Kusec[1] , Chloe Carrick[1] , Pippa Watson[1] , Evangeline Grace Chiu[1] , Elise Milosevich[1] , Bogna Drozdowska[1] , Nele Demeyere[1]

[1]Department of Experimental Psychology, University of Oxford

Objective: Depression is an unfortunately common occurrence after stroke, and is linked with greater difficulties in daily function and poorer quality of life. According to behavioural activation theory, decreases in activity levels are associated with increases in depression severity. The extant literature has demonstrated bidirectional links between reduced activity levels and depression; suggesting that additional variables may explain changes in this relationship. Both objective cognitive impairments and subjective evaluations of cognitive abilities have been demonstrated to relate to emotional distress following stroke; however it is unknown to what degree they explain variance in the activity-mood relationship following stroke.
Participants and Methods: Adults (*M* age = 72.90, *SD* = 12.53) more than 2 years post-stroke (*M* = 4.55 years, *SD* = 2.14) were recruited as part of a cohort study of long-term cognitive and psychological stroke outcomes (OX-Chronic; Demeyere et al., 2021). Participants completed self-report measures of depression (Hospital Anxiety and Depression Scale-Depression; HADS-D), activity levels (Nottingham Extended Activities of Daily Living Scale; NEADL), and subjective cognitive difficulties (Cognitive Failures Questionnaire; CFQ). Participants additionally completed a battery of neuropsychological assessments across domains of attention, memory, executive function, language, number processing, and visuoconstructional abilities. Relative severity of objective cognitive impairment was measured by numbers of neuropsychology tasks impaired. A cross-sectional mediation analysis investigating the contribution of CFQ scores and numbers of tasks impaired to NEADL and HADS-D scores was conducted. Multiple imputation was used to account for missing data.
Results: Complete case data was available for $N = 91$ participants. Though both number of tasks impaired on objective cognitive measures ($r = 0.26$, $p = 0.01$) and CFQ scores ($r = 0.49$, $p < 0.001$) were uniquely correlated with HADS-D scores, in a multiple mediation analysis, only CFQ scores ($\beta = 0.13$, SE = 0.02, $p < 0.001$) and NEADL scores ($\beta = -0.09$, SE = 0.02, $p < 0.001$) had direct effects on HADS-D scores. Further, NEADL scores had indirect effects on HADS-D through only CFQ scores ($\beta = 0.12$, SE = 0.02, $p < 0.001$), suggesting partial mediation effects of subjective evaluations of cognitive abilities. However, NEADL scores had direct effects on number of objective tasks impaired ($\beta = -0.06$, SE = 0.02, $p < 0.001$), but not on CFQ scores ($\beta = -0.07$, SE = 0.09, $p = 0.44$). Study results did not change after conducting multiple imputations.
Conclusions: Subjective evaluations of cognitive abilities may be a better mediator of the activity-mood relationship than objective cognitive impairments in chronic stroke, potentially representing negative interpretation biases of cognitive abilities. However, it seems that objective cognitive impairments are particularly associated with changes in activity levels, despite no links to depression.

Plenary Keynote: NeuroRights: Human Rights Guidelines for Neurotechnology

Presenter: Rafeal Yuste

15:00-16:00h
Thursday, July 7, 2022

Coffee Break

16:00-16:30h
Thursday, July 7, 2022

Poster Session 03

16:00-16:30h
Thursday, July 7, 2022

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01 Self-Reported Executive Dysfunctions in Schizophrenia Patients Abusing Substances

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[2]Harvard Medical School, MA, USA
[3]Spaulding Rehabilitation Hospital, MA, USA
[4]Lund University, Sweden
[5]Haukeland University Hospital, Bergen, Norway

Objective: To investigate how self-reported executive dysfunction in Norwegian patients with schizophrenia spectrum disorders compares to similar patient groups from other European countries and whether patients with schizophrenia disorders and comorbid substance abuse disorders report different and/or more executive dysfunction compared with abstainers. Previous studies have indicated that patients with schizophrenia disorders have more initiation difficulties compared to patients with substance abuse disorders, who have more difficulties with inhibition and working memory. To our knowledge, no studies have investigated whether patients with schizophrenia spectrum disorders and comorbid substance abuse differs from patients with no comorbid substance abuse in the type or degree of self-reported executive dysfunction. We hypothesize that patients with schizophrenia spectrum disorders and comorbid substance abuse will report more difficulties with inhibition and working memory compared to patients without comorbid substance abuse.
Participants and Methods: A clinical sample of 264 patients were included. Inclusion criteria were diagnosis within schizophrenia spectrum disorders, minimum 18 years of age, and Norwegian as first language. Comorbid substance abuse was identified in 100 (37.9%) participants. T-scores on the self-report version of the Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A) were analyzed using frequency and descriptive analyses, and *t*-tests of independent samples. Results were compared to findings from published studies of similar patient groups.
Results: Patients with comorbid substance abuse were on average three years older and had one year less education compared to abstainers (p <.01). Men outnumbered women almost 4:1 (p <.01). Patients with comorbid substance abuse had significantly higher T-scores on the BRIEF-A Inhibit Scale (M=61.6, SD=13.2) compared to patients without comorbid substance abuse (M=57.4, SD=12.1, t(262)= -2.67, p <.01). No other significant differences were found. Overall, scores did not differ from previous findings from other countries in patients with schizophrenia disorders, other than higher scores on the BRIEF-A Inhibit Scale in the substance abuse group. Compared to Norwegian patients with substance disorders, the comorbid group in the current study reported somewhat less executive dysfunction and the group without comorbid substance abuse even less, but still 0.5-1.5 *SDs* above U.S. normative means.
Conclusions: Norwegian patients with schizophrenia spectrum disorders, with and without comorbid substance abuse, had scores on the self-report version of the BRIEF-A ranging from about 0.5-1.5 *SDs* above U.S. normative means. Type and level of dysexecutive problems were for the most part similar to previous findings in patients with schizophrenia disorders in other European countries irrespective comorbid substance or not. However, substance abusers did report significantly more difficulties with inhibition (but not with working memory) compared to abstainers. Overall, patients with comorbid substance abuse reported somewhat less difficulties with executive dysfunction compared to other Norwegian patient groups with a primary diagnosis of substance abuse disorder. Even so, targeting inhibition difficulties might be useful in treatment programs for patients with schizophrenia disorders and comorbid substance abuse.

02 The Persian Version of the Screen for Cognitive Impairment in Psychiatry (SCIP-P) for Bipolar I Disorder

Galin Shirzad[1] , Juana Gomez Benito[1] , Oscar Pino[1] , Georgina Guilera[1] , Scott Purdon[2]

[1]University of Barcelona
[2]University of Alberta

Objective: There is a paucity of cognitive screening tools available in the Persian language sensitive to deficits anticipated in patients diagnosed with bipolar disorders. The Screen for Cognitive Impairment in Psychiatry (SCIP) is a low-cost and easy-to-apply cognitive screening scale that takes approximately 15 minutes to administer (Purdon, 2005). The test consists of 5 subtests sensitive to deficits in immediate

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and delayed verbal learning and memory, working memory, verbal fluency and processing speed, all of which have been implicated in bipolar disorder patients. The Spanish and Danish translations of the SCIP have proven to be reliable and valid in patients with Bipolar Disorder (Guilera et al., 2009, Jensen et al., 2015). The objective of the present study was to evaluate the validity and reliability of the Persian translation of the SCIP to screen for cognitive dysfunction in patients diagnosed with Bipolar type I disorder.

Participants and Methods: The three alternate forms of the SCIP were translated into Persian and administered within a one-week interval to 108 stable patients with Bipolar Disorder and 122 healthy controls within a complete counterbalanced design for the first two visits, followed by a retest of the last form administered at the third visit. Mean age of the patients was 39.53±6.03 years, ranging from 29 to 51 years, similar to the mean age of controls, 39.27±6.58 years, ranging from 22 to 52 years. A Principal Component Analysis was performed to describe the internal structure of the SCIP-P. Internal consistency reliability was assessed with Cronbach's alpha coefficient. Test-retest reliability was evaluated with the intraclass correlation coefficient (ICC). Independent-sample t-tests were conducted to assess anticipated deficits in the bipolar patients relative to the healthy controls. Cohen's d was calculated as a measure of effect size.

Results: The analyses of the dimensional structure revealed a two-factor structure for the SCIP-P explaining 54% of the total variance. Subtests VLT-I, WMT, and VLT-D loaded on the first factor (memory) and the second factor (executive function) was composed by subtests VFT and PST. Cronbach's alpha reached a value of .73 suggesting the SCIP-P was internally consistent.

Test-retest correlation coefficients were high for all subtests, and the SCIP-P total score reached an excellent value of 0.89. Comparisons between bipolar patients and healthy controls on SCIP-P scores showed large effect sizes. Healthy controls scored higher in each subtest, as well as the total score, suggesting that the SCIP-P is capable of differentiating between groups.

Conclusions: The Persian translation of the SCIP offers a rapid and reliable method for quantified screening of cognitive status, and it offers a valid method for detection of deficits in stable patients with Bipolar Disorder. This result is of considerable importance given the prevalence of cognitive impairment in bipolar disorders, the paucity of available Persian-language cognitive screening tools.

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03 Neurocognition in patients hospitalized in a subacute psychiatric unit

Ana Llorente[1] , Encarna Zaldívar[2] , Sheila López-Romeo[3] , David Juanes[4] , David Suárez[5] , Sonia Quiñones[6] , Elsa Quiñonero[7] , Berta Vilaseca[8] , Susana Mohino[9]

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Objective: Cognitive disorders in schizophrenia, schizoaffective disorder and bipolar disorder have been consistently reported during the last 30 years, before the onset of the diseases and in their evolution. Greater cognitive dysfunction has also been highlighted when these disorders occur in comorbidity with disorders related to substances. Declarative memory and executive function are usually the most dysfunctional neurocognitive domains. In this work, we are interested in providing new data on the role of psychopathology and substance use disorder in cognition using a

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neurocognitive screening. We have presented a preliminary version of this research in other scientific forums.
Participants and Methods. We present the results of a retrospective analysis of consecutive cases evaluated during the years 2018-2021 in the Benito Menni CASM subacute psychiatric hospital unit, in Sant Boi de Llobregat (Barcelona). Only tests carried out in a collective setting been included in this study. The variables included were: the score on the copy of the figure of RBANS battery (Randolph, 1998); the delayed memory score of the figure of the RBANS battery; written verbal fluency "animals" and lexical "p"; number of correct productions on the Five-Point Tests of nonverbal fluency (Regard et al, 1982) and the copy and designation of a geometric cube. The data was analyzed with version 21 of the program IBM SPSS statistics. In accordance with current legislation, this study guarantees the confidentiality of the personal data involved.
Results: A total of 131 patients were included, 93 men and 38 women, with an mean age of 42 years old (mean=42.34, SD=12.55). 33.6% of patients diagnosed with schizophrenia, 32.1% diagnosed with schizoaffective disorder and 13.7% diagnosed with bipolar disorder. 51.9% of patients had a comorbid diagnosis of substance use disorder. On average and among all the data, low results are obtained only in the delayed memory of the figure of the RBANS battery (mean= 12.41, SD=5.50) and written verbal fluency: animal fluency (mean=10.41, SD=4.36) and lexical fluency (mean=8.04; SD=3.93). The low results obtained in delayed memory and written animal fluency are not influenced by age when age is included as a covariate in the multivariate statistical model ($p > 0.05$). On the other hand, age could influence low scores in verbal fluency letter "p" ($p=0.031$). No statistically significant difference was observed in the three variables with low results compared to the main diagnosis ($p>0.05$), nor to substance use disorder ($p>0.05$), nor when we consider the main diagnosis together and substance use disorder.
Conclusions: The results obtained are consistent with those reported in the literature on dysfunctional neurocognitive domains in the spectrum of schizophrenia and other psychoses. The statistical analysis performed has not shown differences between the different diagnoses included or greater neurocognitive dysfunction when the disorders studied are accompanied by substance use disorders, perhaps because the patients are evaluated in the subacute phase. Finally, we want to consider that the evaluation of neurocognition improves the diagnosis and interdisciplinary management of patients with subacute pathology in a psychiatric hospital unit for monitoring and psychosocial rehabilitation of adults.

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04 Anterograde amnesia in Schizophrenia?: considerations about a case report.

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Objective: We address the relevance of neuropsychological assessment for single case management of schizophrenia patients in a day hospital setting. Following a translational approach, we specifically aim at updating the evidence concerning episodic memory deficits in the context of possible neurocognitive endophenotypes for single case clinical management.
Participants and Methods: We assessed a 28 years old male diagnosed with schizophrenia in 6 one-hour sessions. The patient has a 79% disability rating and multiple subjective cognitive complaints according to his family. The assessment included a series of interviews and behavioral observations of the patient, an interview with his mother and a battery of cognitive tests. The test battery included WAIS-IV, TAVEC, FCRO and UPSA scale.
Results: Significant episodic memory deficits where observed both for visual (immediate recall ROCF, $z = -1,75$; delayed recall ROCF, $z = -1,88$) and verbal material (TAVEC immediate recall, $z = -5$; delayed recall, $z = -5$; discriminability index, $z = -3$). Executive functions were impaired as evidenced by UPSA (56,22%), behavioral observations during the assessment, and family reports of daily living. Global cognitive abilities as measured by WAIS-IV were within the normal range. However, there was a significant difference between verbal comprehension ($z = 2,32$) and perceptual reasoning ($z = -1,55$). In addition, premorbid IQ was estimated to be above average. The patient showed mild speed processing deficits, whereas normal performance was registered for attention and working memory.
Conclusions: The results revealed an amnesic profile, together with speed processing and executive deficits. All of this is suggestive of hippocampal dysfunction and impaired connectivity with prefrontal cortex, in line with

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an earlier CT scan showing frontal diffuse atrophy. Neuropsychological assessment has proven to be useful for case management in schizophrenia. Deep understanding of the patient's neuropsychological deficits and strengths is a requisite to tailor an optimal individualized treatment.

05 Processing Speed as an Endophenotypic Marker in Patients with a First Episode of Psychosis and their Relatives

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Objective: To explore and compare performance in cognitive functions with special attention to Processing Speed (PS) in first psychotic episode patients (FEP) and their first degree relatives.
Participants and Methods: the sample is composed of five hundred and seventy-nine participants distributed in: 133 FEP patients, 146 parents, 98 siblings, and a control group of 202 patients. All patients were from the program for initial phases of psychosis (PAFIP) at the University Hospital Marqués de Valdecilla (Cantabria, Spain). Processing speed, verbal memory, visual memory, working memory, executive functions, motor dexterity and attention domain were evaluated. Statistical analyses, ANOVA and ANCOVA tests were applied to compare all the groups. A secondary analysis was carried out comparing exclusively siblings and the control group. Sex, age and years of education were included as covariates.
Results: The patients presented a lower performance in all cognitive domains compared to their first-degree relatives and healthy controls, with PS being the domain with the greatest alteration. A second analysis comparing healthy controls and siblings showed worse performance in PS, verbal memory, working memory, executive functions and attention.
Conclusions: The deficit in PS both in FEP patients and in first-degree relatives suggest that PS could be considered an endophenotypic marker in schizophrenia spectrum disorders.

06 Neuropsychological profiles in elderly people with Schizophrenia

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Objective: The presence of cognitive impairment in schizophrenia is widely studied and defined. Cognitive defects are present in the premorbid phases of mental illness and are maintained throughout it. Cognitive impairment in schizophrenia is considered a characteristic and central feature of the disease that determines functional performance.
Cognitive variability in elderly patients with schizophrenia is little studied, as well as its evolution until the end of life.
The neuropsychological profile can be a tool for predicting neurodegenerative pathology in elderly patients with schizophrenia and for in vivo diagnosis of dementia in this population.
Care in long-stay and psychogeriatric units, where professionals directly observe functional decline and the presence of degenerative processes in psychiatric patients, without being able to apply approved therapeutic strategies for this pathological characteristic that has not yet been resolved.
The objective of this work is to study the neuropsychological performance of elderly patients with schizophrenia, identify similarities and differences, try to group them into the different neuropsychological profiles, taking into account both the style of performance and the degree of cognitive involvement.
Participants and Methods: The study participants are 117 donors from the Neurological Tissue Bank of Parc Sanitari Sant Joan de Déu. They are patients with schizophrenia or other related psychotic disorders, admitted to mid- and long-stay psychiatric units in Sant Joan de Dèu.
All donors undergo a complete baseline visit consisting of sociodemographic data collection, a complete medical, psychiatric, neurological and neuropsychological visit.
The neuropsychological battery is made up of the following tests:
- FAB
- MMSE

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- CERAD
- Test Barcelona
- BNT
- WAIS-III
- MIS
- CLOX
- TMT-A
- Poppelreuter
- Luria Clocks

Results:

Coding	Neuropsychological Diagnosis	Brief explanation
1	Mild Executive Dysfunction	Cognitive profile associated with psychosis.
2	Moderate Executive Dysfunction	Cognitive profile associated with psychosis.
3	Severe Dysexecutive Cognitive Impairment with mild diffuse cortical impairment	Cognitive profile associated with psychosis but with onset of impairment related to aging and/or focal lesions
4	Mild Cognitive Impairment	Type MCI. Cognitive profile associated with aging. Pre-dementia stages
5	Moderate Diffuse Cognitive Impairment	Dementia possible In most cases, frontal alterations are more severe
6	Severe Diffuse Cognitive Impairment	Probable Dementia
7	Very Severe Diffuse Cognitive Impairment	Very severe dementia

Conclusions: We have been able to identify seven different neuropsychological profiles in our sample of elderly patients with schizophrenia that differ from the classic profiles in the scientific literature.

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07 Neuropsychological Functioning and Clinical Symptoms following Functional Neurosurgery in Refractory OCD

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Objective: Obsessive-Compulsive Disorder (OCD) is a severe psychiatric disorder characterized by obsessions and compulsions. Both clinical symptoms and neuropsychological impairments had been described in these patients. Cognitive Behavioral Therapy (CBT) using Exposure with Response Prevention and pharmacotherapy with Selective Serotonin Reuptake Inhibitors are first line treatments. However, it is estimated that 40-60% of the patients remain refractory to pharmacological treatment and drop-out rates of CBT are between 9-16%. Functional neurosurgery procedures are among the alternative treatments in refractory OCD, which appeared to be effective in reducing obsessive-compulsive symptoms. Specifically, capsulotomies and cingulotomies are among most common practiced lesion procedures. However, only few studies have described neuropsychological functioning after neurosurgery. The objective of this study was to analyze clinical and neuropsychological changes following functional neurosurgery in an OCD refractory group.

Participants and Methods: Ten OCD patients underwent neurosurgery by radiofrequency or Gamma Knife radiosurgery. All of them underwent bilateral capsulotomy, and six of them also cingulotomy. A comprehensive clinical and neuropsychological evaluation was conducted pre and post treatment. The clinical evaluation included scales of OCD symptoms severity, anxiety, and depression. Neuropsychological assessment included tests of attention, executive function, memory, verbal skills, and speed of processing. Preoperative scores in neuropsychological functioning and clinical symptoms were compared with those obtained after surgery using the Wilcoxon signed ranks test. To perform statistical analyses, the SPSS v.24.0 statistical software package was used.

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Results: Significant improvement in all clinical measures was observed (p<0.05). Comparison between the neuropsychological scores before and after surgery showed no significant changes (p > .05 in all cases) except for Logical Memory II (p=.42), Stroop Colour Naming, Colour Word and Interference (p=.032, p=.041, and p=.037, respectively) and the Tower of Hanoi time scores (p = .047), showing improvement after surgery. A slight worsened performance was found in phonological verbal fluency (A letter) score (p=.031).
Conclusions: Neurosurgery was highly effective reducing OCD symptomatology, anxiety, and depression in all participants. Neuropsychological functioning revealed no major changes after surgery, but subtle improvements were observed in executive function and episodic memory scores. Functional neurosurgery appears to be an effective and safe therapeutic option for psychiatric conditions that do not respond adequately to conventional treatments.

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08 Neuropsychiatric differences between asymptomatic and symptomatic carriers of Huntington´s disease

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Objective: This study aims to analyze the neuropsychiatric profile of asymptomatic and symptomatic carriers of Huntington's disease (HD) compared with healthy controls (HC) and to evaluate the differences between asymptomatic and symptomatic patients with different years of progression of HD.
Participants and Methods: We included 151 participants, 80 HD carriers [35 asymptomatic, 19 symptomatic (<5 years of evolution), 26 symptomatic (>5 years of evolution)] and 71 HC matched by sex and educational level. Motor function was evaluated with UHDRS, the general cognitive status was assessed with MoCA test, and a comprehensive battery of scales was included to assess the neuropsychiatric profile. The following neuropsychiatric domains were assessed: anxiety, irritability, apathy, suicide, quality of life, depression, and daily life activities. One-way ANOVA and Tukey's test for post-hoc analysis was performed to analyze and compare the neuropsychiatric profile between the four groups.
Results: Statistically significant differences were found in the motor function ($F_{(3,147)}$=93.8; p<.001), and in the general cognitive status ($F_{(3,145)}$=27.7; p<.001), and neuropsychiatric symptoms such as depression ($F_{(3,144)}$=5.7; p<.001), apathy ($F_{(3,146)}$=9.1; p<.000), general quality of life ($F_{(3,146)}$=6.7; p<.000), and daily life activities ($F_{(3,146)}$=22.5; p<.000) between groups. We did not find statistically significant differences between healthy control, asymptomatic and symptomatic <5 years of evolution in neuropsychiatric symptoms. The symptomatic group >5 years of evolution presented more motor and neuropsychiatric symptoms and worse general cognition than the rest of the groups (p<.05).
Conclusions: Our results pointed out a worsening in motor, cognitive and neuropsychiatric symptoms according to the disease progression. The symptomatic group >5 years of evolution presented more depressive and apathy symptoms, worse quality of life, and less capacity for daily life activities.

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09 Validity of the ACE III for the detection of cognitive impairment in people with psychosis in India.

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Objective: Individuals with psychosis typically experience cognitive deficits in several cognitive domains. In India it is estimated that

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there are more than 4 million people with schizophrenia, but there is a dearth of neuropsychological assessment tools for the assessment of cognition in people with psychosis. This study examined whether people with psychosis (including those with early psychosis or established schizophrenia) were impaired compared to healthy controls on a version of the Addenbrookes Cognitive Examination III that was linguistically and culturally adapted for use in West Bengal.
Participants and Methods: We administered the Addenbrooke's Cognitive Examination-III Bengali Version (BACE-III) to a sample of 140 healthy controls and 71 patients with psychotic disorders including early psychosis (n=31) and established schizophrenia (n=40). Participants were assessed in Kolkata, a socio-economically diverse, multi-ethnic, and multi-cultural city. Mann-Whitney U tests were used to test for group differences and ROC analysis was carried out.
Results: There were no differences between the groups for age (p=.14), gender (p=0.28), and education (p=.51). The patient group scored significantly lower on the BACE-III total (p=<0.001) and performed significantly worse than controls across subdomains: Attention (p=<0.001); Fluency (p=<0.001); Memory (p=<0.001); Language (p=<0.001); Fluency (p=<0.001). Early psychosis and established schizophrenia groups were both impaired compared to controls, but there was no difference between the two groups. ROC analysis showed that the BACE III had excellent diagnostic accuracy (AUC 0.87).
Conclusion: Our data provide evidence that BACE-III is useful in identifying cognitive deficits in people with psychosis, including those who are early post onset and those with more established schizophrenia. The finding of no significant difference between the early and established groups highlights the presence of cognitive deficits early in the course of psychosis. We suggest that the BACE-III, a brief and comprehensive cognitive screening tool could assist clinicians in identifying people who may need support for cognition in everyday life.

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10 Validation of a Culturally Neutral Prospective Memory Test in Healthy Adults & People with Psychosis in India

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Objective: Individuals suffering from psychotic disorders, including schizophrenia and early psychosis, have deficits in several neurocognitive domains, including deficits in Prospective Memory (PM), which is an individual's ability to carry out intentions after a delay. PM is important for everyday living, social and occupational functioning. Although PM deficits have been documented previously in psychosis, relatively few studies have attempted to understand this problem in the South Asian setting, particularly in India. Currently, there is no socio-culturally relevant test or questionnaire to assess PM in psychosis specifically for the Indian population.
Participants and Methods: We developed the Green and Orange Balls Test (GOBT) a computer-based PM task that is free of cultural and language constraints. A sample of 140 healthy controls and 71 patients with early psychosis and established schizophrenia were assessed in Kolkata, a socio-economically diverse, multi-ethnic, and multi-cultural city. In addition to the GOBT, the Cambridge Prospective Memory Test (CAMPROMT), a standardized test of PM was administered. A Mann-Whitney U test was used to test for group differences.
Results: There were no differences between the groups for age (p=.14), gender (p=0.28), and education (p=.51). The patient group made significantly more errors (p=<0.001), time taken to complete the task (p=<0.05) on the GOBT, and performed significantly poorer on the CAMPROMPT (p<0.001) in comparison to controls. We also found significant correlations between CAMPROMT Event (r=-0.46, p=<0.001)and Time (r=-0.56, p=<0.001) score with GOBT Errors.
Conclusion: Our data provide further evidence of PM difficulties for people with early and established psychosis and provide initial validation of the GOBT. The validity of such a test with little language constraints in other neurodegenerative disorders across different cultures should be the focus of future research.

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11 Memory deficits in children and adolescents with psychotic disorders: A systematic review and meta-analysis

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Objective: Cognitive symptoms in psychosis represent a major unmet clinical need [1]. Deficit in memory has been largely described in first episode early onset psychosis [2] and has been associated to a worse functionality [3]. However, results from existing studies are quite mixed on memory deficits of early psychosis patients, particularly in terms of memory contents and storage resources.
The aims of this study were 1) to examine the nature and extent of cognitive impairment in early-onset psychosis and 2) to analyze which type of memory (verbal and visual) is more affected in the disorder.
Participants and Methods: The present systematic review and meta-analysis was conducted according to the PRISMA criteria [4]. A systematic search of CINAHL, PsycInfo, PubMed, Redalyc, SCOPUS and Web of Science (published from 2000 to 2020) identified case-control studies of early onset psychotic disorder (under 18 years old). Those studies focused on both verbal and visual memory performance.
Results: Twenty articles were included in the review. A deficit in memory in child and adolescent psychotic disorders was obtained displaying a large effect size in memory tasks (g = -0.83). Also, a medium effect size was found in visual memory tasks (g = -0.61) and a large effect size was found in verbal memory tasks (g = -1.00).
Conclusion: It was observed a strong memory deficit on early psychotic disorders already present at the onset of the illness. This deficit was stronger when verbal memory tasks were used compared to the effect found with visual memory tasks. Based on previous literature [5][6][7], these results contribute to describe and characterize the cognitive symptoms in the first-episode psychosis in a youth population.

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12 Association of Hypertension to Brain Structure and Depression in Persons with Multiple Sclerosis

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Objective: Persons with multiple sclerosis (pwMS) have a 1.3- to 1.5-fold increased risk for cardiovascular disease, higher cardiovascular risk burden, and a significantly higher prevalence of depression than the general population. Hypertension (HTN) is a known cardiovascular risk factor that has been linked to accelerated aging, brain pathology, depression, and worse functional outcomes in the general population. Though less understood in MS, hypertension has been associated with greater disability and brain changes, but additional investigations are needed to further understand these relationships. Given hypertension is a modifiable risk factor, it makes it a viable target for intervention in pwMS. Thus, the primary aim of the current study is to investigate the impact of hypertension on brain structure and depression severity/proneness in pwMS to inform future interventions.

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Participants and Methods: Fifty-three pwMS between the ages of 27-76 were included in the study. Participants partook in one study session involving blood pressure (BP) measurements, behavioral measures, and magnetic resonance imaging (MRI). Systolic and diastolic BP were measured three times during the study session, and each was averaged to obtain a mean systolic and diastolic BP value. Participants were placed in "HTN" (N=33) and "no HTN" (N=20) groups based on BP cutoffs established by the American Heart Association. Statistical Parametric Mapping 12 (SPM12) was used to segment high resolution structural scans (i.e., T1w) and SPM12's Lesion Segmentation Toolbox was used to quantify whole brain lesion volume (mL). White matter fraction (WMF) and gray matter fraction (GMF), measures of gray and white matter volumes that account for intracranial volume, were calculated. The Beck Depression Inventory-II (BDI-II) and Depression Proneness Rating Scale (DPRS) were used to quantify depression severity and proneness, respectively. The Symbol Digit Modalities Test (SDMT) measured cognitive functioning.
Results: The sample was predominantly female (73.6%) with a mean age of 52.45 (SD=11.52). Most of the sample (66%) reported a relapsing-remitting disease course. After accounting for age and sex, there was a significant difference in GMF between groups ($F(1, 49) = 5.618$, $p=.022$), such that those with HTN had less GMF (i.e., lower gray matter volume). Lesion volume and WMF were not significant, though WMF showed a trend ($p=.076$). After accounting for age and sex, there was a significant difference in DPRS scores between groups ($F(1, 49) = 4.83$, $p=.033$), such that those with HTN reported greater depression proneness. No significant group differences were found for BDI-II or SDMT.
Conclusion: The current study examined the impact of hypertension on brain structure and depression severity/proneness in a sample of pwMS. Results show that hypertension has a negative impact on gray matter volume and depression proneness in this sample. These results are consistent with what has been found in both neurological and non-neurological populations and have specific implications for long-term outcomes, especially in the context of cardiovascular x aging interactions. Given the modifiable nature of cardiovascular risk factors (i.e., hypertension), it would be beneficial for future work to investigate contributors (e.g., social determinants of health) and potential interventions that may mitigate the negative impact of cardiovascular risk factors.

13 Strength of functional connectivity between regions implicated in perspective-taking

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Objective: Given the paucity of neural studies investigating perspective-taking in individuals with autism spectrum disorder (ASD) population, there is limited data on neural mechanisms underlying perspective-taking and social cognition deficits in ASD. In an attempt to explore this relationship, we investigated differences in resting-state connectivity strength of regions specifically involved in perspective-taking. Studies suggest that the left supramarginal gyrus (SMG) and precuneus show consistent activation in tasks involved in perspective-taking. Therefore, we evaluated functional connectivity in these regions. Additionally, we have also evaluated resting-state connectivity strength between the medial frontal gyrus (MFG) and left medial temporal gyrus (left-MTG), these regions play a crucial role in perspective-taking processing during the theory of mind.
Participants and Methods: In a pilot study, we enrolled adolescents with ASD and neurotypical (NT) adolescents between the ages of 11 to 18 years to undergo a resting-state functional neuroimaging. The resting-state functional connectivity analysis was performed between the seed regions (left-SMG, precuneus, left-MTG, and MFG). Participants also filled out the Social Responsiveness Scale which assesses social ability and autistic traits.
Results: The analysis showed that the connectivity strength between the left-SMG and precuneus is weaker ($t(9)= -2.250$, $p=.05$;) among adolescents with ASD compared to NT adolescents.
We also found that connectivity strength between the left medial temporal gyrus (left-MTG) and the selected seed (MFG) was negatively correlated ($R^2=0.59$, $F(1,7)=10.2$, $p=0.015$) with the social responsiveness scale (SRS) total scores, suggesting that higher autism traits were associated with weaker connectivity.
Conclusion: These results are in line with earlier studies that report perspective-taking task

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performance shows positive coupling and excitatory influences between the medial prefrontal cortex (mPFC) and the MTG. Further, these results suggest that reduced connectivity between the IPL and precuneus region may relate to the reduction of social cognition abilities in autism. In summary, our pilot data show reduced connectivity between the left-IPL and precuneus among ASD compared to NT adolescents. Further, this connectivity is predictive of impaired social cognition (perspective-taking) skills in ASD. Finally, the atypical connectivity strength between MFG and left-MTG implicated in social awareness and cognition deficits suggests the existence of a neurophysiological correlate of perspective-taking.

14 Determinants of Cognitive Problems in Major Depression

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Objective: Patients with Major Depressive Disorder (MDD), in addition to the clinical symptoms that define their pathology such as anhedonia and lack of interest, have cognitive problems. The objective of our study was to explore the association between the presence of these cognitive difficulties and the clinical variables together with health-related variables.
Participants and Methods: Cognitive scores on processing speed, short-term memory. strategy use and working memory, and executive functioning tests were gathered from a well-characterized groups of 74 patients with current MDD and 68 healthy controls (HC). Sample characterization was done through a comprehensive interview which included demographic (age, sex, marital status, estimated intelligence quotient -IQ-, years of education and current job status), clinical (age at illness onset, Hamilton Depression Rating Scale-17 items -HDRS-17-, stage of illness measured by the Maudsley Staging Method (MSM), antidepressant medication -in mg/day dosage), and health-related variables (tobacco use, and general physical activity measured using the International Physical Activity Questionnaire - IPAQ-, body mass index -BMI-, waist circumference, blood pressure, fasting blood sugar level, cholesterol and triglycerides level) were acquired.
All these variables were compared between HC and MDD patients by means of χ^2 test (or Fisher´s exact test when expected frequencies in each cell were lower than 5) for categorical variables and t-tests or ANOVA for continuous variables (p-value correction was applied to control for multiple testing).
Cognitive functioning raw scores were z-transformed in which higher scores meant greater cognitive deficit –therefore some of the scorings were inverted– and were adjusted by age, IQ and gender using a regression model, before comparing HC and MDD patients. In order to obtain a global cognitive dysfunction index (GCDI) an exploratory factor analysis, using principal component analysis (PCA) to extraction method, was carried out with the whole sample, including all the tests from the CANTAB. Unrotated solution was then used as the dependent variable.
To test the hypothesis of associated factors to cognitive symptoms, multivariate backward stepwise linear regression models were run.
Results: Significant neuropsychological deficits were evident in MDD compared with HC in the global cognitive index (F=8.29; df=1, 140; p=0.005). In the regression analysis performed on MDD and HC, years of schooling (β=-0.11; p=<0.001), job status (β=-0.50; p=0.016), physical activity (β=-0.25; p=0.04) and age at illness onset (β=0.17; p=0.017) were statistically significant factors associated to cognitive impairment. The regression model ran in HC showed that only years of schooling was a significant factor (β=-0.07; p=<0.001) in this group.
Conclusions: MDD patients have cognitive difficulties that are associated with schooling, job status, age at illness onset and performance of physical activity. These results support the importance of the implementation of interventions targeting the cognitive reserve and lifestyle habits of MDD patients, in addition to

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the conventional therapeutic approach focused on symptoms relief.

Keywords: Major depressive disorder; cognitive impairment; years of schooling; health-related variables; physical activity; age of onset.

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15 Cognitive Performance in Patients with Major Depressive Disorder is Related to their Immunometabolic Status

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Objective: Domains such as psychomotor speed, memory and executive functions have been found to be affected in patients with major depressive disorder (MDD) from the onset of the first episode and even after the episode has remitted. However, the specific risk factors of these alterations are not yet known. This study aimed to explore whether inmunometabolic parameters are related to cognitive performance in MDD as compared to healthy controls (HC).
Participants and Methods: Sample consisted of 84 patients with MDD and 78 HC. Both groups were compared on the results of cognitive performance measured with the Cambridge Neuropsychological Test Automated Battery (CANTAB), the presence of metabolic syndrome (MetS) and an inflammatory/oxidative index of peripheral biomarkers (tumor necrosis factor, C-reactive protein and 4-hydroxynonenal).
A principal component analysis (PCA) was carried out to extract summative profile factors from the inflammatory and oxidative stress markers, as well as from cognitive domain scores.
A multiple linear regression was carried out to study the association of sociodemographic and clinical variables with cognitive components. A forward covariate entry strategy was followed and 5 regression models were estimated: 1) model without covariates; 2) model with clinical covariates: condition (HC/MDD), sex (male/female), age and medication loading (measured by DDD); 3) model with metabolic covariates (besides the model 2 covariates): MetS (no/yes); and 4) model with inflammatory covariates (added to model 3 covariates): PCA inflammatory/oxidative factor scores and 5) model with immunometabolic covariate interaction covariate (added model 4 covariates): interaction between MetS and inflammatory/oxidative index.
The regression model with a better fit was endorsed by lower levels of the Akaike Information Criterion (AIC). T bcoefficients (with 95% confidence interval) were used asloading estimates.
Results: Significant differences were obtained in the inflammatory/oxidative index between both groups ($F_{(1,157)}$= 12.93; p< .001), also in cognitive performance ($F_{(1,157)}$= 56.75; p< .001). The inmunometabolic covariate regression model (i.e., condition, sex, age and medication loading, MetS, inflammatory/oxidative index and the interaction between MetS and inflammatory/oxidative index) was statistically significant ($F_{(7,157)}$=11.24; p< .01) and explained 31% of variance. The associated factors to cognitive performance were Being MDD or HC, (b=-0.97; p< .001), age (b=-0.28; p< .001) and interaction between inflammatory/oxidative index and MetS (b=-0.38; p= .02)..
Conclusions: Our results highlight the relevance of immunometabolic biomarkers and their interactions in relation to cognitive performance, opening a line of research in patients with MDD. Specifically, evidence of the joint association of metabolic and inflammatory dysregulation with cognitive symptoms suffered by these patients is provided.
Therefore, immunometabolic agents should be taken into account when dealing with cognitive impairment of MDD. Longitudinal design are required to ascertain the progression of cognitive performance, together with immunometabolic factors so as to establish trajectories and risk scores.

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16 Cognitive Flexibility and Mind-Wandering: Different Profiles in Anxiety?

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Objective: Having a high level of anxiety is often theorised to be associated with impairments in cognitive flexibility. Individuals with a high level of trait anxiety also appear to have distinct off-task thought (mind-wandering) profiles—tending to be more repetitive and negative than their low trait anxiety counterparts. This study explored how mind wandering characteristics differ across anxiety levels and investigated the role that cognitive flexibility has to play in anxiety.
Participants and Methods: Participants comprised university students (N=49). The participants were assessed on several different questionnaires. These included the Spielberger Trait Anxiety Inventory, Penn State Worry Questionnaire, Beck Depression Inventory, Cognitive Flexibility Inventory, and Four Factor Imagination Scale. From these questionnaires we were able to obtain subjective assessments of trait anxiety, depression, worry, cognitive flexibility and a profile of mind wandering. The participants then partook in some tasks that would provide similar measures of these same variables. These included the Sustained Attention to Response Task, Alternate Use Task, and the Shapes Expectation Task.
Results: To investigate the underlying structure of the questionnaires assessing trait levels of depression, anxiety, worry, cognitive flexibility and mind wandering, data collected from 49 participants were subjected to principal axis factoring with direct oblimin rotation. Three factors were identified as underlying the questionnaire scales/sub-scales, accounting for around 64% of the variance.
To assess the size and direction of the linear relationship between the factor scores and performance on cognitive tasks, a bivariate Spearman's correlation coefficient (ρ) was calculated.
Factor 1 (high frequency negative mind wandering and anxiety/depression symptoms) was positively associated with higher levels of unintentional mind wandering (ρ = .322, p=.024) and state anxiety in the experimental session (ρ = .293, p = .041). However, there was no association with total mind wandering (p= .076) —highlighting that it is not an increase in mind-wandering occurring in these participants, instead it's negative and unintentional mind-wandering.
Factor 2 (cognitive flexibility) was positively associated with amount of time spent on task (ρ = .308, p = .031). However, when these participants do mind wander, they are more likely to be memory-based construction/simulation) mind wanderings (ρ = .316, p= .027).
Factor 3 (directedness) was not significantly associated with any task measures.
Conclusions: This study offers a comprehensive investigation of mind-wandering profiles in anxiety. It is evident that people with high levels of trait anxiety experience disproportionately more mind-wanderings that are negatively valenced and unintentional. However, we also see a higher level of cognitive flexibility associated with a less distressing and disruptive type of mind-wandering. Further, these findings highlight the role that cognitive flexibility plays in anxiety and points to a potential avenue for therapy in anxiety.

17 Poor Executive Function and Mortality in Advanced Chronic Kidney Disease Patients in Hemodialysis

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Objective: Advanced chronic kidney disease negatively affects cognition in the older population. In addition, older patients on hemodialysis have shown more significant cognitive declines, especially in tests of frontal-executive functioning, with age being the only significant risk factor for such worsening according to the studies. Our objective is to know the relationship between age, cognitive impairment and mortality, in a group of patients with suspected cognitive impairment undergoing renal replacement therapy of hemodialysis.
Participants and Methods: Retrospective descriptive study, from January 2017 to December 2019, of hemodialysis patients referred for complete neuropsychological assessment due to subjective memory complaints or suspected cognitive impairment. The battery of neuropsychological tests to assess

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cognitive function includes the global cognitive screening test of the Mini Cognitive Examination of Lobo (MEC), memory tests (AVLT and Digit test – WAIS), nominative language (Boston Naming Test), visual gnosis (from Luria-Nebraska Battery), praxis and frontal-executive functioning (Trail Making Test and verbal fluency for cognitive flexibility assessment). Classic hemodialysis risk factors for mortality (vascular access type, albumin levels, hyperphosphataemia, Kt/v, hyperparathyroidism and diabetes mellitus) are included in the analysis. A multivariate analysis adjusted for possible confounding variables is performed.
Results: The sample is made up of 21 men and 10 women, with a mean age of 75.94 years (SD=10.76). At the time of review, 45.2% had died (14/31 patients), with a significantly older age (x=81.14 years vs x=71.65; t=2.88; p=0.009). Deceased patients had poorer performance in MEC, learning and working memory tests, attention, language and frontal functioning (cognitive flexibility), with a p<0.05. **In our mortality prediction model, adjusted for age and global cognitive level, frontal-executive functioning is the only independent predictive variable (OR 1.43; p=0.025).**
Conclusions: In our sample of patients, frontal-executive functioning would be the predictive factor for mortality. Neuropsychological assessment, associated with a specific action to maintain frontal-executive functions in hemodialysis patients, could improve their survival. More studies are necessary in this line.

18 Role of Sarcopenia in Cognitive Function in Patients with Morbid Obesity Before Bariatric Surgery

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Objective: Obesity is shown to be related to global cognitive decline, being especially altered the executive function and the information processing speed. Additionally, sarcopenic obesity (SO) is associated independently with a deterioration in global cognition, executive function, information processing speed, global memory and cerebral atrophy in patients >65 years. However, at present there is no data regarding the role of sarcopenia in the cognitive function in patients with morbid obesity (MO) <65 years.
Participants and Methods: We conducted a cross-sectional study were we recruited seventy-five patients selected from those attended at the MO Unit of our hospital that went under Y-de-Roux gastric by-pass. Body composition by bioimpedance analysis (BIA) and Neurocognitive Test Battery were assessed in all patients 1 month prior bariatric surgery (BS). The Cognitive Battery includes Free and Cued Selective Recall Reminding Test (FCSRT), Rey–Osterrieth complex figure test (FCRO), Bonston Naming Test (BNT), Digit Span, Visual Span, Trail Making Test (TMT), Symbol Digit Modality Test (SDMT), Stroop, Verbal and Phonetic fluency, Grooved Pegboard Test and Go/No-Go Task. For identifying subjects with SO by BIA, we used the skeletal muscle mass index (SMI) (SM/height²). We set that obese subjects from the lowest tertile of SMI were sarcopenic whereas those from the two highest tertiles were not.
Results: Twenty-five patients were allocated in the SO group and 50 in the non-SO group. Almost all patients in the SO group were female (96% vs 50%), older (56.5±6 vs 51±9 years), with lower BMI (42±4 vs 45±5 Kg/m²) and higher fat mass (%) (50±4 vs 43±8) (p<0.005). After regression analysis, age significantly correlated with direct visual span, Trail Making Test A, Trail Making Test B and Go-no go test. There were no significance differences in any test between patients with or without SO.
Conclusions: There were not differences in cognitive performance between patients with or without SO in our cohort of seventy- five patients with MO and younger than 65 years old. The data provided in this study may be useful in the cognitive assessment of these patients. Larger series are needed in order to confirm these preliminary results.
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19 Brain Functional Connectivity Alterations Related to Fatigue in Post-COVID Condition

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Objective: Post-COVID condition has been described in patients with history of COVID-19 infection, with symptoms that persist after 3 months from the onset (Soriano et al., 2021). Symptomatology related with post-COVID condition is diverse, ranging from chronic fatigue, anosmia, dyspnea, pain, and cognitive symptoms also called "brain fog" (Hewitt et al., 2021). Increasing body of evidence suggests that fatigue symptomatology is one of the most prevalent and disabilitating symptoms that persist after infection (35% to 60%) (Fernandez-de-las-Peñas, et al., 2021). The main objective of the present study was to evaluate the functional connectivity alterations related to fatigue in long-COVID patients.
Participants and Methods: Eighty-six participants with long-COVID were recruited. Based on the scores on the Modified Fatigue Impact Scale (MFIS) test using the suggested cut-off of 38 for long-COVID (Arnanz et al., 2021), patients were divided into the Fatigue group (F-COVID) (n=70) and not fatigue group (NF-COVID) (n=16). Neuroimaging acquisition was performed including T1-weighted images and resting-state fMRI acquisition. Participants underwent a clinical assessment that included the MFIS for fatigue assessment, the State-Trait Anxiety Inventory (STAI), and Beck Depression Inventory-II. Moreover, as an objective measure of cognitive fatigue, we included the STROOP test. Functional connectivity analysis was performed using Conn Functional Connectivity Toolbox. SEED-to-voxel analysis was performed to investigate brain connectivity alterations in the fatigue network previously described (Wylie et al., 2020), including as SEEDS: ventromedial prefrontal cortex (vmPFC), left insula, striatum, left dorsolateral prefrontal cortex (DLPFC), and dorsal anterior cingulate cortex (dACC). Functional connectivity differences between groups were performed with depression and anxiety as covariates ($p<0.05$ FDR corrected; two-sided). Correlation analyses were performed between functional connectivity results and clinical outcomes.
Results: F-COVID group showed alterations compared to the NF-COVID group. F-COVID group showed increased connectivity from the left Caudate to bilateral frontal pole ($p=0.028$), and paracingulate gyrus ($p=0.028$). In addition, reduced functional connectivity was found from dACC to the left temporal pole in the F-COVID group compared to the NF-COVID group ($p=0.013$). Correlation analyses showed significant associations between all connectivity results and MFIS total score ($p = [<0.001-0.001]$). In addition, the F-COVID group showed positive associations between Caudate-Frontal Pole connectivity with Stroop 2 (color reading) ($p=0.029$) and Stroop 3 (color-word) ($p= 0.023$). These associations were not significant in the NF-COVID group.
Conclusions: Findings from this study revealed that fatigue symptomatology in COVID patients is partly related to brain functional connectivity alterations, showing altered connectivity between hubs from the fatigue network with frontal, and temporal areas. Striato-frontal alterations might influence cognitive dysfunction in these patients. Future studies should evaluate whether these functional alterations are accompanied by structural alterations in patients with post-COVID condition.

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20 Cognitive Impairment in Patients with Post-COVID Condition

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Objective: Post-COVID condition is a novel syndrome that describes a wide range of symptoms that persist several weeks or months after acute COVID-19 infection (Soriano et al., 2021). Recent studies revealed that patients suffering post-COVID condition usually report cognitive complaints (Hewitt et al., 2021), but the extent of these cognitive deficits has not been deeply addressed. The main objective of the present study was to evaluate the cognitive performance in patients with post-COVID condition with a comprehensive neuropsychological battery. The second main objective was to evaluate the relationships between cognitive dysfunction and fatigue

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symptomatology in patients with post-COVID condition.
Participants and Methods: Fifty patients with post-COVID condition were recruited 9.12±3.46 months after the acute infection. Age- and education matched healthy controls were also recruited. Participants underwent computerized neuropsychological battery Vienna Test System® (Schuhfried GmbH; Mödling, Austria). Moreover, paper/pencil neuropsychological assessment was also administered including: forward and backward digit span, Corsi block-tapping test, Symbol Digit Modalities Test (SDMT), Boston Naming Test (BNT), Judgment Line Orientation (JLO), Rey-Osterrieth Complex Figure (ROCF) (copy and recall at 3, 30 minutes, and recognition), Free and Cued Selective Reminding Test (FCSRT), verbal fluency, Stroop Color-Word Interference Test, and the Visual Object and Space Perception Battery (VOSP). Fatigue symptoms were assessed with the Modified Fatigue Impact Scale (MFIS). Statistical analyses were performed in Statistical Package for Social Sciences (SPSS).
Results: Patients showed cognitive impairment on several tests compared with healthy controls. Regarding the computerized Vienna test, patients presented with impairment in visual vigilance (p=0.005), intrinsic alertness (p=0.017), selective attention (p=0.043), TMTA (p=0.008), TMTB (p=0.006), inhibition (p=0.016), FGT recognition (p=0.003), and N-Back Incorrect answers (p=0.004) compared with healthy controls.
Regarding paper/pencil cognitive assessment, patients revealed a frequency of impairment between two to three times more frequent than expected in healthy population in attention and working memory (digit span forward and backward, Corsi forward), executive functions (Stroop test), memory (FCSRT learning and recall), visuospatial memory recognition (ROCF), verbal fluency, and visuospatial ability (VOSP number location, discrimination of position, progressive silhouettes and JLO). MFIS showed moderate and negative correlations with Corsi test (backward), SDMT, FCSRT (delayed free and delayed total recall), ROCF (memory at 30 minutes), Stroop (part B), VOSP (object decision), and smooth pursuit eye movements.
Conclusions: Findings of the present study revealed presence of cognitive impairment in patients with post-COVID condition. Attention deficit, executive dysfunction, memory and visuospatial ability showed greater deterioration. These cognitive symptoms showed relationships with fatigue symptoms. Future studies are needed to evaluate the neural mechanisms related to cognitive dysfunction in patients with post-COVID condition.

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21 Towards a (Neuro)psychological Toolbox for Brain Surgery Aftercare.

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Objective: Surgery for brain tumor removal compromises a person´s physical, cognitive and psychological health and requires multidimensional aftercare planning. Here we extend our previous report surveying the character and frequency of post-surgical assessments and interventions (Sierpowska et al., submitted), by examining the specific (neuro)psychological domains covered by these assessments. The ultimate applied goal of this work is to build a proposal for an optimal (neuro)psychological assessment toolbox in brain surgery aftercare.
Participants and Methods: Healthcare professional teams from 38 institutions in 15 European countries completed an online survey inquiring about the methods they use for (neuro)psychological postoperative assessments at their institutions. We examined methods in four aspects of patient care: (1) speech and language, (2) cognitive abilities (other than language), (3) emotional well-being, and (4) health-related psychological distress. Additionally, we specified five time-points at which these assessments are usually performed: (1) bedside = 1-10 days after surgery, (2) acute stage of recovery = 11-60 days, (3) early recovery = 2-5 months, (4) late recovery = 5-12 months, and (5) long term = 1 year after surgery. Participants could select the neuropsychological tasks proposed and/or add their own suggestions in a free-text manner. Quantitative results were analyzed using descriptive statistics and comments were interpreted and summarized qualitatively.
Results: For analyses reported here, we grouped all timepoints together. We considered that centers have a preference for a specific domain when minimally 80% of responding centers

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assess it. Data showed that, in terms of language and speech (which is offered by 30/38 surveyed European centers), there exist a preference for assessing spontaneous speech, comprehension, phonological and semantic fluency, and object naming. Cognition (assessments offered by 27/38 centers) is mainly explored by evaluating visual perception, attention, working, short-term, and long-term memory, and executive function. Emotional well-being (explored in 21/38 centers) is mainly evaluated by anxiety and depression questionnaires. Health-related psychological distress (15/38 institutions) is assessed by questions on work reinsertion, and the burden of adjuvant treatment, disease and/or epilepsy.
Conclusions: This is the first study to report on the most common (neuro)psychological domains assessed during the first year of recovery after brain tumor removal and at long term (12 or more months after surgery). We include information about the commonness of assessing a specific language (e.g., verbal fluency) and cognitive (e.g., working memory) domains, as well as of evaluating the psychological (e.g., anxiety) and physical health (e.g., fatigue) in Europe. This information has a great potential for application, as it can serve to propose a neuropsychological toolbox for medical professionals working with individuals after brain surgery and, in the long run, to build new follow-up protocols from scratch or to expand on the existing ones in a flexible manner (e.g., accommodating time constraints, language-specific availability of tests, and/or individual patients' needs).

22 Cognitive impairment associated with Multiple chemical sensitivity syndrome

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Objective: Multiple chemical sensitivity (MCS) is an acquired, chronic disorder characterized by the existence of recurrent symptoms that appear in response to exposure to chemical compounds (at concentrations considered non-toxic for the general population). Medical diagnosis is complex, and the etiology is uncertain and multifactorial. The prevalence shows a great difference between people who consider themselves sick (0.48-15.9%) and those diagnosed by the doctor (0.5-6.3%). The prevalence is much higher in women than in men. Frequently is associated with other syndromes such as Myalgic encephalomyelitis/Chronic fatigue syndrome and Fibromyalgia.
Pollution and exposure to chemical products is associated with a higher prevalence of chronic diseases. Chemical substances can interact with our cells and accumulate in our body, causing changes and affecting our health. These elements are commonly used in all industries and are present in our daily lives. This exposure could cause of number of diseases such as Central Sensitization Syndrome (CSS), including MCS. They are considered multifactorial syndromes, but they all have in common the hyper-reactivity of the central nervous system as the basis of their origin. A very frequent symptom is the existence of a subjective cognitive complaint.
The objective is to evaluate the cognitive functioning of people with CSS and make this minority disorder visible in the field of neuropsychology for a proper approach.
Participants and Methods: This is a descriptive study of 3 cases with a medical diagnosis of MCS. They were evaluated by a neuropsychologist in the Neurological Service of the Can Misses Hospital in Ibiza (Balearic Islands, Spain). In the interview, sociodemographic and clinical data were obtained from 3 women (mean age of 44 years, range from 42 to 46, and education range from 22 to 8 years). The neuropsychological tests used to assess the different cognitive domains have been validated and standardized for the Spanish population, and are set out below: global cognitive status (Montreal Cognitive Assessment), sustained, selective and divided attention (Trail Making Test A and B), working memory (Verbal Span Forward and Backwards), information processing speed (Symbol Digit Modalities Test), visual and verbal episodic memory (Freed and Cued Selective Reminding Test; Rey-Osterrieth Complex Figure); and semantic and phonological verbal fluency (Animals, "P"). The direct scores obtained were adjusted for age and education to the Z score.
Results: The results of the neuropsychological evaluation showed deficit in attention, working memory and information processing speed. They also showed deficit in verbal episodic

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memory in both immediate and delayed retrieval, and language.
Conclusion: The evaluation of cognitive functioning in patients with MCS shows an alteration in the domains of attention, executive functions (processing speed, working memory, verbal fluency), episodic memory and language (denomination). This pattern of cognitive impairment is not primarily or solely due to an affective disorder.
Neuropsychological approach is essential to evaluate, diagnose and monitor these patients, as well as treat and palliate evolutionary deterioration. It is necessary to continue research to facilitate a multidisciplinary approach and improve the quality of life of affected people.

23 How do Patients Tolerate Brain Stimulation During Awake Craniotomy Procedure?

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Objective: In recent years, modern neurosurgery has been paying more and more attention to the good functioning and high quality of life of the operated patients. There are a number of methods that can be used to indirectly assess the functional map of the brain and thus increase the safety of surgery. However, none of them is as reliable as direct brain stimulation combined with intraoperative neuropsychological examination. The aim of the study was to evaluate how this method is tolerated by the operated patients.
Participants and Methods: We included to the study 54 patients (34 men and 20 women), aged 20-78, who were qualified for the awake craniotomy procedure due to the brain tumor in an eloquent area. Most of the patients had a lesion in dominant hemisphere (left: 46 vs right: 8). Nineteen patients had a tumor in the parietal lobe, 14 - in the frontal, 11 - in the temporal and 10 within insula. Participants were asked to complete the Hospital Anxiety and Depression Scale (HADS) and ten-point visual analogue scales (VAS) for assessing pain and stress. Evaluation was performed two times: before the surgery and two days after.
Results: The majority of participants tolerated the procedure well. The level of stress in the preoperative (M = 3,51; SD = 1,54) and intraoperative (M = 1,88; SD = 1,03) period was minor. Our patients assessed the intraoperative pain as tolerable (M = 1,96; SD = 1,10) and in any case was it necessary to interrupt the operation. Moreover, study showed, that level of self-assessed pain was positively correlated with stress during the surgery (r = 0,28; p = 0,041) and scores of both: depression (r = 0,52; p = 0,011) and anxiety (r = 0,57; p = 0,004) subscales of HADS performed before the surgery.
Conclusions: All patients tolerated the awake craniotomy well. None of the patients dropped out of the procedure, there was also no need to stop the procedure due to the patient's condition. Pain and stress levels were rated as low and tolerable. The association between perceived pain and the preoperative level of anxiety and depression indicates an important role of the psychological components of the reported experiences. Extensive preoperative psychological preparation should be considered a key part of the procedure.

24 Long-Term Neuropsychological Deficits Among Hospitalized COVID-19 Patients

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Objective: WHO has recently defined post COVID-19 condition as one that occurs in individuals with a history of confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months. One of the most common reported symptoms are the cognitive complaints, but their clinical determinants are poorly understood. We aimed to determine, first, the prevalence and the profile of cognitive dysfunction among patients hospitalized for COVID-19 based on neurological symptoms during the acute phase; and secondly, the relationship between cognitive complaints, test performance and psychological distress.

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Participants and Methods: We evaluated 100 patients (44% women) who were hospitalized for COVID-19. The neuropsychological assessment was performed at least three months after discharge. Forty-one percent of patients completed two evaluations of the three planned (3-6 months, 6-12 months, and 12-18 months). The inclusion criteria were age between 18 and 60 years and no previous history of cognitive complaints or neurological disorders. Participants were classified according to their neurological symptoms during the acute phase. Neuropsychological assessment included a screening test (MoCA) and test for attention/ processing speed (SDMT), working memory (Digit span), visuospatial abilities (JOL, ROCFT), verbal learning (FCSRT) and fluency (phonetic and semantic). Subjective Complaints Questionnaire (MFE-30), Modified Fatigue Impact Scale-5 (MFI-5), Impact of Events Scale-Revised (IES-R) and the Brief Symptom Inventory-18 (BSI-18) were included to assess cognitive complaints, fatigue, and psychological distress. To model the explanatory factors of cognitive complaints, negative binomial regression for repeated measures was used.
Results: There were no differences in demographic and clinical variables (age, educational level, time to hospital discharge, mechanical ventilation, or biomarkers) between groups. Results showed no statistically significant performance differences between patients with and without neurological symptoms. Forty-five percent of participants scored in the range of mild cognitive impairment in the MoCA test. The most impaired cognitive functions were verbal Learning (FCSRT total recall) and semantic fluency, with one in three participants obtaining a scale score ≤7 adjusted for age and educational level at 3-6 months and 6-12 months assessments. Female sex, IES-R symptoms over the cut-off scores, MFI-5 higher scores, and mild cognitive performance on MoCA test increase the risk of cognitive complaints (MFE-30).
Conclusions: Cognitive deficits compatible with the post COVID-19 condition are frequent among people hospitalized for COVID-19, even more than a year after the disease. The most frequent difficulties affect verbal learning and semantic fluency, and they are not related to neurological symptoms during the acute phase. Fatigue and post-traumatic stress symptoms are risk factors for cognitive complaints, which should be considered when planning rehabilitation.

25 Neuropsychological deficits in children with congenital hydrocephalus: a systematic review

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Objectives: Pediatric hydrocephalus is a global health and social problem. The most common form of congenital hydrocephalus is due to both spina bifida, and myelomeningocele although it could also be caused by hemorrhage. The physical symptoms (disproportionate skull, headaches, nausea, irritability, etc) have been well studied; however, the neuropsychological profile associated with this neurological condition is not so clear. This review aims to explore the neuropsychological deficits associated with patients who were diagnosed during childhood with congenital hydrocephalus.

Participants and Methods: This review has been based on the PRISMA 2020 Declaration. A search was carried out in the WOS, Pubmed, Scopus and ProQuest databases, using booleans and limits. The keywords were selected from Thesaurus: hydrocephalus, children, neuropsychology and others. Eligibility criteria included: empirical studies which were written in English/Spanish and published in the last 10 years whose description followed the PICOS method.

Results: The initial review yielded a total of

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236 papers. After elimination of duplicate papers, 81 papers were counted and reduced to 17 when the proposed eligibility criteria were applied. Studies focused on patients with hydrocephalus due to spina bifida (H-SB) show poor cognitive performance, especially in areas such as executive function (planning and/or working memory). In addition, studies with children with hydrocephalus caused by myelomeningocele (H-MM) show a cognitive impairment in visuospatial and visuomotor skills; while studies about children with post-hemorrhagic hydrocephalus (H-PH) present a generalized neuropsychological profile which includes the impairment in memory, language, visual and motor areas. Finally, studies focused on children with a diagnosis of both spina bifida and myelomeningocele (H-SBMM) show that they have longer reaction times in the execution of tasks, and deficits in attention, response inhibition and reading comprehension, compared to a control group and also when compared to children with a diagnosis of H-PH. Further, these studies have found that factors such as age at diagnosis, amount of damaged gray matter and others may modulate cognitive performance in this specific group.

Conclusions: Pediatric congenital hydrocephalus is associated with a heterogeneous neuropsychological profile modulated by the origin of this diagnosis. In this review significant differences in the cognitive improvement of H-SB, H-MM, H-PH, and H-SBMM groups are found; sometimes modulated by factors such as age, shunt treatment and social environment. These results implicate the adaptation of the neuropsychological evaluation protocol according to the origin of the diagnosis of congenital hydrocephalus in this child population.

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26 Laboratory Predictors of Neuropsychological Functioning in Sickle Cell Disease

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Objective: Patients diagnosed with sickle cell disease (SCD) are at risk for neuropsychological deficits due to a combination of disease and psychosocial risk factors. Several studies have documented that lab values of disease severity (e.g., fetal hemoglobin, total hemoglobin) are associated with neuropsychological performance. Yet, findings are inconsistent, likely due to methodological differences based on when lab values are collected and how they are incorporated into analyses. The objective of this project was to examine the associations between lab values and neuropsychological performance in SCD using several possible metrics.

Participants and Methods: As part of a lifetime cohort study (Sickle Cell Clinical Research Intervention Program), 406 patients ranging from 8-25 years of age (Mean=13.96, Standard Deviation=4.76) diagnosed with SCD (62% HbSS/Sβ^0-thalassemia) received a neuropsychological evaluation. All evaluations were supervised by a licensed psychologist and included measures of intelligence, processing speed, working memory, executive functioning, memory, and academic achievement. Lab variables included total hemoglobin, fetal hemoglobin, daytime oxygen saturation, platelets, and white blood cell count. Socioeconomic status was measured using the Social Vulnerability Index, an indicator of social vulnerabilities at the neighborhood level. All analyses were conducted separately based on SCD genotype (HbSS/Sβ^0-thalassemia vs. HbSC/SB+thalassemia/Other) to account for differences in disease severity and treatment indication. Lab values were examined as predictors of neuropsychological performance based on 1) mean lifetime value, 2) lifetime standard deviation, 3) most recent value (within 3 months from neuropsychological assessment), and 4) area under the curve. Univariate associations were conducted with all outcomes after correcting for multiple comparisons to control the false-discovery rate (FDR). Multivariable linear regression models were built for each type of measurement (e.g., mean lifetime, most recent) with a base model including age at evaluation, current hydroxyurea treatment, and SVI to predict overall intelligence. Lab values with significant associations at $p<0.10$ were included in the multivariable analyses to obtain the final model using step-wise model selection.

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Results: Among patients diagnosed with HbSS/Sβ^0-thalassemia genotype, univariate analyses demonstrated that mean lifetime and most recent fetal hemoglobin values were positively associated with measures of intelligence, processing speed, executive functioning, and academic achievement (all pFDR<0.05). The most recent measures of daytime oxygen saturation were positively associated with performance measures of intelligence, processing speed, working memory, and verbal memory (p<0.05), but these associations did not maintain significance after correcting for multiple comparisons. Among patients diagnosed with HbSC/SB+thalassemia/Other genotype, no lab value metrics were associated with any neuropsychological outcome (all pFDR>0.05). Stepwise models for patients diagnosed with HbSS/Sβ^0-thalassemia genotype revealed that the most recent model, including daytime oxygen saturation and fetal hemoglobin accounted for the greatest amount of variance in intelligence (R^2=0.14). The mean lifetime model, including fetal hemoglobin, accounted for 13% of the variance in intelligence.
Conclusions: Associations between lab values and neuropsychological performance in SCD differ based on when the labs are collected and how they are analyzed. Our analyses suggest that the most recent or the mean lifetime measurement of fetal hemoglobin is most predictive of neuropsychological performance in children and young adults with HbSS/Sβ^0-thalassemia.

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27 Neuropsychological Profile Associated to PKAN

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Objective: Pantothenase Kinase-associated neurodegeneration (PKAN) is characterized by an abnormal accumulation of iron in basal ganglia and progressing varied extrapyramidal clinical symptoms (dysarthria, muscular rigidity, parkinsonism, chorea, dysphagia, optic atrophy, retinal degeneration, and bradykinesia). Classic presentation usually appears around the second half of childhood (6 to 10 years of age), although late-onset cases (10 to 15 years old) have been described. Scientific literature describing cases in which classic symptoms appear before the age of five is rare.
Objective: To describe the neuropsychological profile associated to very early onset PKAN (under five years of age)
Participants and Methods: clinical and qualitative study of two male patients aged 4 years and 11 months (Case 1) and 7 years and 11 months (Case 2) at the moment of assessment, with motor symptoms from birth and diagnostic confirmation of PKAN before 5 years of age. Their neuropsychological profile was assessed with specific tasks adapted to each of the patient's motor, speech, and language characteristics.
Results: in both cases abnormalities in the frontal-subcortical networks are apparent, as previously described for PKAN. But, unlike other cases, there are no anomalies in other cognitive functions. Language development and praxis were limited and atypical.
Conclusions: the neuropsychological profiles of these two case studies provide new data on the development of this disease, especially with respect to the impact of motor symptoms (dysarthria, anarthria, dystonia, and lack of motor coordination). These cases present abnormalities in the acquisition of language, communication, and praxis, which limit the patients' behavioural, social, and learning skills. These profiles have not been observed in prior studies with later-onset patients. Our study provides limited initial data to be further complemented with a longitudinal study, which should help refine the atypical neuropsychological profile observed in PKAN.

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28 In Search of a Neuropsychological Profile for Migraine: a Systematic Review

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Objective: Migraine is commonly overlooked by the general population and by professionals in research and practice as a novel head pain rather than recognised as a cyclic disorder of the nervous system which is defined by significant abnormal psychological, physiological, and neurological pathologies. Given its frequency as the third leading cause of disability worldwide there is minimal research outside the scope of

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neurology and pharmacology in the literature (Meng et al., 2018; Steiner et al., 2015; Stovner et al., 2018). The existing literature on neuropsychological and cognitive functioning in migraine is laden with contradictory findings with alternative reviews suggesting no significant cognitive dysfunction or long-term decline among the population (Gil-Gouveia & Martins, 2019). Moreover, it is difficult to grasp the neuropsychological profile of migraineurs due to the cyclic nature of the disorder. With this in mind, a systematic review of the literature was conducted with the goal of identifying cognitive domains associated with deficits in migraine and assess the applicability of the existing literature via the ictal phase of functioning observed.
Participants and Methods: Databases including PubMed, PsychInfo, Scopus, EMBASE and OpenGrey were methodologically searched using the following syntax: (Migraine) AND (cognition OR neuropsychology OR neuropsychological OR neurobehavioral OR neurocognitive) AND ("decision making" OR attention OR mood OR memory OR "spatial behaviour" OR perception OR sleep). For the purpose of this review and to capture the current scope of the literature, research published in the last 15 years (from January 1st 2006 to May 31st 2021) were included. A total of 1,730 eligible studies remained following extraction of duplicate references. Following the screening process, a total of 83 studies were inspected further to ensure relevance to the review and overall credibility, leading to 61 eligible studies that were included in the systematic review.
Results: Individuals with migraine show a mixed profile of cognitive performance, based on the length and chronicity of migraine history and the interaction of mood and sleep disorders. While some studies consistently report problems in associative learning and memory; auditory processing and memory; abnormal attention processing, lower processing speed and problems across a range of executive functions (decision making, prospective memory); other studies find no significant differences when compared to controls in areas such as visual processing, attention, episodic or working memory; and a minority of studies even report a better performance in both short and long term visuospatial memory. Lack of consistence across studies in sample selection, sample sizes, episodic versus chronic migraineurs, aura versus non aura, ictal phase, etc. may affect the clarity and consistency of results observed.
Conclusion: Further research properly addressing the role of age, chronicity, comorbidities, ictal phase of functioning observed is needed alongside increasing consistency across diverse neuropsychological assessment protocols that try to disentangle the complex picture of a neuropsychological profile in migraine. More research focused on preictal, and postictal functioning will be beneficial as it is likely that similar to the temporary manifestation of head pain, much neuropsychological and cognitive dysfunction will be observed during these stages and not inter-ictally.

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29 Executive Function is Impaired and Linked to Gut Microbiota in Patients with Irritable Bowel Syndrome.

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Objective: Studies on the role of microbiota related to cognition are still few and less well-developed than studies on emotions. A recent review by Tooley (1) presented some promising results linking executive function to gut microbiota. The present study investigated this link in a group of patients with irritable bowel syndrome (IBS). IBS is a debilitating disorder affecting as many as 1 in 10 people globally (2). The disorder is primarily characterized by chronic abdominal pain (3), but also psychological conditions like anxiety (4) and depression (5). Furthermore, an imbalance in the gut microbiota composition, dysbiosis, is reported by 70-80% (6). In the present study we ask i) which aspects of executive function are affected in patients with IBS, and ii) are they linked to a measure of dysbiosis in gut microbiota?
Participants and Methods: A total of 62 participants from a Norwegian Brain-Gut-Microbiota project (7) were included, 41 defined with a diagnosis of IBS according to the Rome-III criteria and 21 defined as healthy controls. Executive function was assessed by self-reports on the adult version of the Behavior Rating Inventory of Executive function (BRIEF-A) and microbiota was assessed by the GA-map Dysbiosis Index (DI).
Results: Patients with IBS obtained significantly higher ($p<.05$) raw scores than the control group (n=41) on the following BRIEF-A subscales: emotional control, initiation, working memory function, plan/organize and shifting,

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and on the Behavior Regulation Index (BRI) (p=.003), the Metacognitive Index (MI) (p<.001) and Global Executive Composite scale (GEC) (p<.001). The correlations with the DI in the IBS group were statistically significant both for the BRI (r=.33, p=.02), the MI (r=.28, p=.04) and the GEC scores (r=.36, p=.01).
Conclusions: The results showed that our cohort of patients with IBS struggle with several challenges related to executive functioning in their daily life, leaving inhibition, task monitoring, organization of materials and self-monitoring unaffected. This indicates that the patients with IBS can remain focused and organized in most tasks, but may still struggle in situations demanding emotional control, initiative, working memory function and flexibility. We suspect that these problems are related to the chronic pain and the emotional problems commonly associated with IBS. The moderate and statistically significant correlations between the global BRIEF-A indexes and the dysbiosis index in the IBS patients are main contributions of the present study. This shows the importance of a system view on IBS (8), taking the whole brain-gut-microbiota axis into account in research as well as when assessing and treating patients with IBS.
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30 Virtual-reality data-driven phenotypes of Attention-Deficit/Hyperactivity Disorder

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Objective: Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most prevalent childhood-onset disorders worldwide. DSM and ICD diagnostic systems base ADHD diagnosis on a six out of nine criteria cut-off for two inattention and hyperactivity/impulsivity dimensions. Nonetheless, this traditional nosology has proven unable to account for the great heterogeneity of ADHD subtypes in symptom manifestation, neuropsychological correlates and functional outcomes. In the last decade, person-centred approaches stimulated by Research Domain Criteria (RDoC) and Hierarchical Taxonomy of Psychopathology (HiTOP) initiatives are being used to better characterize the disorder. In line with this trend, we aimed to identify novel and homogeneous ADHD phenotypes taking advantage of virtual reality (VR) technology.
Participants and Methods: 161 ADHD and typically developing (TD) adolescents (12-16 years, M_{age}=14.02, SD_{age}=1.31; 44.09% females) from Spain, Argentina, and Paraguay participated in this study. ADHD participants had a formal diagnosis by a professional. TD participants had no reported history of neurological or psychiatric disease. Participants completed AULA, a continuous performance test embedded in VR. AULA recreates a virtual classroom in which the participant has to undergo two Go and No-Go paradigms while distracting stimuli try to interfere with performance. We applied hybrid hierarchical k-means clustering analyses to AULA main outcome measures (selective attention, sustained attention, processing speed, distractibility, impulsivity and head-motor activity).
Results: The best clustering solution yielded five distinct groupings: two ADHD subgroups, both constituted primarily of ADHD participants, both with attentional and inhibitory impairments, but distinguishable by opposing profiles on processing speed and impulsivity measures; two normative subgroups, mostly TD participants, with respectively well and above average performances on AULA outcomes; and a Sluggish Cognitive Tempo (SCT) subgroup, mostly TD participants that, although within the normative range overall, was characterised by poorer attentional performance and processing speed than the other normative subgroups. This latter group had very low levels of motor

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activity. ADHD subtypes, as characterised by DSM, were equally distributed among the five-cluster solution.
Conclusions: Based on our data, AULA, an advanced VR test, seems a useful tool to capture distinct patterns of cognitive heterogeneity within ADHD. Our data demonstrated, for the first time, a novel contribution of hyperactivity and distractibility to the ADHD subtyping field. Our results suggest these processes may not be useful to differentiate between ADHD subtypes as considered by DSM or ICD. Further studies including evaluation of multiple neurocognitive domains beyond those of attention and inhibitory control are now encouraged to get a better understanding of this disorder.
Funding: Spanish Ministry of Science and Innovation [PID2019-108423RB-I00] and Regional Government of Andalusia [P20_00308].
Keywords: Attention-Deficit/Hyperactivity Disorder, Continuous Performance Test, Virtual Reality, Clusters, subtypes.

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31 Executive and memory functions in adults with sickle cell disease

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Objectives: Sickle cell disease (SCD), characterized by sickle-shaped red blood cells, is a highly represented worldwide genetic disorder. SCD is associated with many acute and chronic complications, particularly brain damage (e.g. Stroke, cognitive disorders, silent brain lesions). Although related neuropsychological deficits have been well described in pediatric patients, they remain understudied in adults despite the impact on quality of life and autonomy. The main objective was to characterize the cognitive profile in SCD adults. To investigate to what extent brain lesions explain this cognitive profile, we studied relationships between neuropsychological results, brain abnormalities and patients' characteristics.
Participants and Methods: From January 2020 to September 2021, a consecutive cohort of SCD adults screened for disease-related vasculopathy was included (n=96; mean age: 29.7 ± 10.2; 56% female; 46% with an educational level below the secondary education diploma; 23% did their schooling in another country). We specifically compiled a rapid battery of tests adapted to SCD patients who did not meet usual inclusion criteria for neuropsychological assessment (educational level and/or language of the host country). This battery assessed the cognitive functions likely to be altered in SCD adults, namely executive functions (mental switching, speed processing) and memory (short-term, working and episodic memory). Anxious and depressive symptoms were screened using self-report questionnaires. All patients also had a brain MRI, and an arterial work-up.
Results: SCD adults cognitive profile was mainly characterized by deficits in processing speed in 56% of patients, followed by deficits in short-term memory (33%) and working memory (24%) whereas episodic memory and mental switching seemed less frequently impaired (respectively 8% and 6%). Anxious symptoms were found in 38% of patients and depressive symptoms in 24% of patients. Brain MRI showed lacunar or territorial infarcts in 56% of patients, white matter lesions in 75% of patients, and vasculopathy in 55% of patients. Preliminary results showed that cognitive disorders were mainly explained by territorial infarcts and educational level, but not by anxiety and depression. Interestingly, 50% of patients who had no lacunar or territorial infarcts showed deficits in processing speed, suggesting that psychomotor slowing might be a core neuropsychological sign of SCD.
Conclusions: The cognitive profile of SCD adults seems to be characterized by a psychomotor slowing and deficits in short-term and working memory. These neuropsychological impairments were only partly explained by territorial infarcts. Although they were also explained by a low-level of education, future research is needed to better understand SCD related mechanisms underlying such cognitive profile. Taken together, these results suggest the need for a systematic assessment of cognitive functions in SCD adults, even in the absence of territorial infarcts.

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32 Music Cognition in Children and Adolescents with Williams Syndrome

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Objective: The neuroscience field of music has seen great growth in recent years, although it is still much less studied than other human cognition domains. The study of populations with specific and well-defined genetic disorders may be of special relevance for the understanding of musical cognition and to understand genetic correlates of this cognitive domain. Williams Syndrome (WS) is a genetic disorder caused by the deletion of approximately 28 genes on chromosome 7q11.23. The present study aimed to describe the musical profile in children and adolescents with WS.
Participants and Methods: The sample was composed by twelve participants between 6 and 19 years old (M=10.92, SD=2.47) with a clinically and genetically confirmed diagnosis of Williams Syndrome, of whom 58.3% were girls. Children with typical development matched in terms of chronological age and sex joined the control group. The SALK/McGill Music Inventory was applied to parents and guardians of children and adolescents. The questionnaire, which has 46 items, aims to assess dimensions such as: interest in music, creativity and musical reproduction, emotional response to music, and musical training.
Results: Results showed that a 100% of the WS participants has Hyperacusis, a rare auditory phenomenon characterized by increased sensitivity and auditory acuity in which the individual may have difficulty tolerating even everyday sounds. In 50% of cases, attenuation of symptoms during development was reported. Only one child with TD reported hypersensitivity to sound ($\chi2(1)=20.31$, $p<0.01$). About global musical skills, people with WS were described as better performers (U=32, $p=0.02$). There was no statistically significant difference regarding the accuracy of musical reproduction. Children with TD were evaluated as playing, on average, more of the same song than children with WS (U=38, p=0.05). The percentage of children with WS who play instruments was 41.7%, while for children with TD it was only 16, 7%, although it was not statistically different ($\chi2(1)=1.82$, p=0.18). No differences were found regarding interest in musical activities, however, children with WS dedicate an average of 1-2 hours more per week to these activities (U=20.5, p=0.04). No differences were found regarding the age of onset of interest in music-related activities (U=60, p=0.97).
Conclusions: Our study highlights the importance of studying the relationships between genes, brain, cognition, and behavior. Limitations regarding sample size might be considered. Therefore, studies with a larger sample size and which use direct observation measures of musical skills in this population are relevant. Despite the presence of impairments in cognitive domains that appear to underline by the same neural circuitry, our results point to relatively preserved cognitive and motor function with respect to musical activities in WS. Thus, musical skills may be considered an area of strength within the cognitive profile of WS. Our findings are in line with the perspective that the WS cognitive phenotype is characterized by a pattern of peaks and valleys in mental and motor function.

33 Neuropsychological Profile of a Cohort of Children with Inborn Errors of Metabolism

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Objective: Inborn errors of metabolism (IEMs) encompass a set of more than 1,100 low-frequency diseases. Despite the fact that 80% of them have neurological symptoms, neuropsychological studies are very scarce. This study aims to define neurocognitive phenotypes of IEMs during the paediatric stage, analyzing the differences between intoxication-type and energy-deficiency type IEMs.
Participants and Methods: The sample was obtained from the Neurometabolic Unit at Sant Joan de Déu Hospital in Barcelona (intoxication-type N= 31 and Energy deficiency type N= 11). Intelligence was measured using the Wechsler Intelligence Scale for Children IV, and those patients with IQ>70 were assessed with a complete standardized neuropsychological battery. Statistical analysis was carried out using the software IBM SPSS 23.0.
Results: Intoxication-type IEMs showed greater intellectual disability (52%) and greater difficulties in motor and executive functions. Energy-deficiency type IEMs had greater difficulties in language and motor skills. Epilepsy and consanguinity correlated positively with intellectual disability.
Conclusions: Inborn errors of metabolism present with greater intellectual disability than the general population. Different neurocognitive phenotypes could be established depending on

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the physiopathology of these disorders encompassed in a more simplified classification. Predicting the cognitive performance of this population can be useful to establish new guidelines for early detection and intervention, which may improve long term outcomes and prevent neuropsychiatric disorders and learning disabilities, which have an impact on patients' daily functioning and quality of life.

34 Neurocognitive Impairment in Inborn Errors of Metabolism: Systematic Review

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Objective: This systematic review of the literature aims to collect the evidence available to date about the cognitive and behavioral impairment of a large number of inborn errors of metabolism (IEM). Despite that each disease has a particular physiopathological involvement, neuropsychological profiles could be established by clustering the diseases into a new simplified classification: intoxication-type (small molecules accumulation disorders) and energy deficiency-type (cell membrane carriers, cytoplasmic defects and mitochondrial defects). Predicting the cognitive performance of this population can be useful to establish new guidelines for early detection and intervention, which may improve long term outcomes and prevent neuropsychiatric disorders and learning disabilities, which have an impact on patients' daily functioning and quality of life.
Participants and Methods: The PubMed database was searched for articles reporting neuropsychological outcomes in children and adults with intoxication-type and energy deficiency-type IEM, before January 2022. Up to 617 diseases were reviewed (intoxication-type n=196; energy deficiency-type n=421), using the words "cognition" AND "name/synonym" of each disease. Complex molecules IEM were excluded from this review. Animal studies, reports with non-standardized cognitive assessments and other reviews were also excluded. The analysis of the data was carried out using Pearson's Chi-Square, Fisher's exact test and Ordinal by ordinal Gamma.
Results: A total of 331 studies were identified. After applying all criteria, 142 papers were included in this review (intoxication-type n=99; energy deficiency-type n=43). There's been an increase in studies across the years, especially regarding executive functions. In the last decade, speech and motor functions have been reported to be more preserved and intellectual disability less severe. Children showed less severe cognitive outcomes than adults. There were a greater number of articles on intoxication type IEM (75%) and the most frequently documented groups of IEM were urea cycle disorders, organic acidurias and galactose metabolism disorders. Overall, the most described impairments were deficits in executive functions (34.1%), attention (31.3%) and behavioral and emotional disorders (28.6%). Energy deficiency-type IEMs present more often with moderate-severe intellectual disability and deficits in executive functions, processing speed, speech, motor skills, social cognition and behavioral and emotional disorders. Intoxication-type IEM are frequently described with deficits in executive functions, attention, language, motor skills, social cognition and behavioral and emotional disorders.
Conclusions: This review summarizes the literature about cognitive functioning in a large number of inborn errors of metabolism. The neuropsychological caracterization of this population can be encompassed through a simplified classification. This population is at higher risk of presenting cognitive impairment, especially regarding attentional and executive functions, as well as neuropsychiatric disorders. More research is needed to further understand the underlying mechanisms of these cognitive and behavioral outcomes.

35 Is Cognitive Functioning Discussed with Brain Tumour Patients during Presurgical Decision Making?

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Objective: Many brain tumour patients have cognitive problems that are present before deciding on surgical treatment. To our knowledge, no studies have explored what is discussed about cognitive functioning with brain tumour patients in presurgical consultations with the neurosurgeon.
Participants and Methods: As part of a larger observational study, we collected 12 audio-

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recordings of presurgical consultations of adult brain tumour patients (low-grade glioma (n=3), high-grade glioma (n=4), meningioma (n=5)) and their neurosurgeons (n=10). The audio-recordings were transcribed and coded by two independent coders. A thematic analysis was conducted to gain insight into how cognitive functioning is discussed in presurgical consultations.
Results: Discussion of cognitive functioning occurred in 11 out of 12 pre-surgical consultations (92%). Cognitive functioning was discussed in relation to three main themes: 1) cognitive complaints of the patient, 2) surgical treatment options that take cognitive functioning into account; and 3) cognitive recovery following surgical treatment. For theme 1 it must be highlighted that neurosurgeons actively asked about cognitive complaints and language is the most frequently discussed cognitive domain. Theme 2 revolves around surgical treatment options, both cognitive functioning and neuropsychological testing are often discussed in relation to the procedure of awake surgery. Theme 3 encompasses cognitive problems following surgical procedures and the uncertainty expressed regarding the recovery of patients' cognitive functioning.
Conclusions: Cognitive functioning of brain tumour patients is discussed in nearly all presurgical consultations in relation to three main themes. The discussion of cognitive functioning facilitates the decision-making process and contributes to the assessment of whether the (oncological) benefits outweigh the (functional, including cognitive) risks of surgical treatment for an individual patient.

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36 Neuropsychological profile associated with breast cancer survival: a systematic review

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Objective: A large proportion of breast cancer survivors (BCS) report cognitive complaints that become a significant concern and have a negative impact on their quality of life. Previous studies have shown that cancer survivors often experience short-term cognitive deficits, but it is not known how long these deficits last or whether they worsen over time, which may influence possible return to work. In turn, it is also unknown whether there is a clear neuropsychological profile in this type of population or whether different treatments provided for this disease correlate more frequently with these cognitive deficits. Therefore, the aim of this review is to explore neuropsychological deficits in breast cancer survivors.
Participants and Methods: This review was based on the PRISMA 2020 Statement. A search was performed in the WOS and Pubmed databases, using booleans and limits. Keywords used and present were: breast cancer survivor, cognitive function, cognition, cognitive impairment, cognitive dysfunction; including intervention and treatment exceptions. English-language studies published without a time limit were selected.
Results: The initial review yielded a total of 315 papers. After elimination of duplicate papers, 314 papers were counted and reduced to 57 when the proposed eligibility criteria were applied. The results show that, although subjective cognitive complaints stand out significantly, there is an association between the diagnosis of breast cancer and the treatment applied (mainly chemotherapy, radiotherapy and surgery) with significant neuropsychological deficits. Specifically, the breast cancer survivor population shows a deterioration in cognitive functions such as episodic memory, working memory, attention, executive functions, among others. In fact, it has been established that approximately half of them could meet the National Institute on Aging/Alzheimer's Association (NIA/AA) criteria for mild cognitive impairment (MCI).

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Conclusions: The neuropsychological profile associated with breast cancer survivorship focuses primarily on processing speed, memory, attention, and executive functions. The results included in the present review suggest that cancer survivors are at increased risk of developing and suffering from long-term cognitive deficits. Therefore, it is necessary to implant and implement cognitive rehabilitation programs in the cancer treatment process with the aim of guaranteeing reincorporation into the labor market.
**This work has been carried out as part of the Research Project (PII2021_10) financed by the Valencian International University.*

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37 LLA and Cognition and Academic Achievement: a Systematic Review

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Objective: To synthesise the scientific evidence available in the literature on the cognitive and academic effects of induction chemotherapy in surviving patients diagnosed with acute lymphoblastic leukaemia.
Participants and Methods: It is a systematic review type theoretical design.
Type of study: Experimental and observational design studies such as randomised controlled trials, comparative cohort studies, among others. Theoretical or review studies will be excluded.
Participants: Studies investigating children or adolescents with an upper limit of 18 years who have received treatment and survived acute lymphoblastic leukaemia will be included.
Results: We identified 272 studies. Two reviewers filtred the studies and made qualitiy evidencia assessment. Finally were included only 12 studies for quatitative analysis. Seven of nine studies, agrouped, show a negative effect on cognition (g de Hedge 0.67 [95%, IC 0.48 - 092]. Three of three studies, agrouped, show a negative effect on academic achievment (g de Hedge 0.46 [95%, IC 0.24 - 0.86]. Heterogeneity test were high (I1=72,2% and I2=81,5%). For both variables, the total effect was 0.60 (g de Hedge, 95% IC 0.24 - 0.87).
Conclusions: Of the 12 studies reported, from the literature review, it is evident that induction chemotherapy shows a negative effect on cognition and academic performance. The quality of the evidence and level of heterogeneity suggest considering the results as referential.

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38 Associations Between Cognitive Functioning, Coping and Depressive Complaints in Low-Grade Glioma Patients

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Objective: patients with low-grade glioma (LGG), who underwent surgical resection and are eligible for proton therapy generally have a relatively favourable prognosis; in at least 50% of all patients the expected survival is 10 years. As curing is not possible, treatment is focused on prolonging overall survival while maintaining good quality of life. An important factor influencing quality of life in this patient group is cognitive dysfunction. It is hypothesized that cognitive dysfunction may interfere with the ability to develop and access effectively adaptive coping strategies. In turn,

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this could be related to increased depressive complaints as patients cannot effectively cope with problems and stressful situations. The aim of the present study is to analyse the associations between cognition, coping and depressive complaints in LGG patients that are eligible for proton therapy.
Participants and Methods: included were 73 LGG patients referred to the University Medical Center Groningen for proton therapy. Assessment consisted of neuropsychological tests (15 Words Test; memory, Reaction Times Tests; processing speed and divided attention and Zoo map; planning) and questionnaires examining coping (Utrecht Coping-List) and depressive complaints (Hospital Anxiety and Depression Scale). Associations between the different measures of cognitive functioning, coping and depressive complaints were analysed with Pearson and Spearman correlations.
Results: 13% of the included LGG patients reported depressive complaints (score >7). Regarding coping, 13% used more than average active coping and 35% used more than average passive coping. Most cognitive impairments ($\leq 10^{th}$ percentile or profile score ≤ 2) were found in memory (43%), followed by divided attention (27%) and planning (11%). No impairment was found in processing speed. Regarding the relationship between cognitive functioning and coping, surprisingly, better scores on divided attention and planning were related to more passive coping, both $r(67) = .31$, $p < 0.05$ (*two-tailed*). No cognitive measures were related to active coping. Higher use of passive coping was related to more depressive complaints, $r(67) = .34$, $p < .01$ (*two-tailed)*. Active coping was not significantly related to depressive complaints $r(67) = -.16$, $p = .188$. Lastly, only slower processing speed was related to more depressive complaints, $r(67) = .27$, $p < .05$ (*two-tailed*).
Conclusions: we found that cognitive impairments were not clearly related to decreased use of active coping and increased use of passive coping. Hence, LGG-patients with cognitive impairments might still be able to learn and use non-passive coping strategies to handle their impairments and to manage stressful situations. This is important, as higher use of passive coping was also found to be related to more depressive complaints. On the other hand, better cognitive functioning was not necessarily related to higher use of active coping, which in turn was not related to less depressive complaints. It is important to bear these outcomes in mind when seeing and treating LGG-patients and be aware of signs of depression in patients presenting with passive coping and slower processing speed. It would also be interesting for further studies to investigate if methods to decrease passive coping lead to less depressive complaints in LGG-patients.

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39 Neurocognitive Decline in Patients with 4-20 Brain Metastases Treated with Stereotactic Radiosurgery

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Objective: Stereotactic radiosurgery (SRS) has been increasingly used to treat metastatic brain tumors due to more favorable neurocognitive outcomes compared to whole brain radiation therapy (WBRT). Previous studies have shown that patients with 1-3 brain metastases who receive WBRT+SRS are at a greater risk for neurocognitive decline at 4 months compared to those who received SRS alone (Chang et al., 2009). However, SRS may also impact cognition. As part of two therapeutic clinical trials conducted at MD Anderson Cancer Center (protocols 2011-0875 and 2011-0884) we evaluated neurocognitive function in patients with brain metastases treated with SRS alone.
Participants and Methods: Adult patients with 4 to 20 melanoma brain metastases (2011-0875, n=33) and non-melanoma brain metastases (2011-0884, n=26) were treated with SRS on clinical trials at MD Anderson (n=59). All patients completed neurocognitive testing prior to and after SRS treatment. Patient raw scores were converted to standardized scores using published normative data, adjusted for age, education, and sex where appropriate. Neurocognitive impairment on any one test was defined as a z-score of $\leq$ -1.5. Neurocognitive decline was determined by the reliable change index (RCI) from baseline to 4 months for all tests. Frequency of impairment at baseline and neurocognitive decline at the 4-month post-SRS follow up time point is reported.
Results: On average, patients were 57.8 (SD=12.7) years old with 14.8 (SD=2.9) years of education. Patients were generally male (62%) and right-handed (80%). There were no significant socioeconomic differences between

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melanoma and non-melanoma patients. Neurocognitive impairment on at least one neurocognitive test was present in 61% of patients at baseline with Grooved Pegboard (Dominant Hand, 34%, Non-Dominant Hand, 31%) being the most frequently impaired test. At 4 months, 25% of patients declined on measures of motor dexterity, 16% on measures of executive function, 13-19% on measures of memory, and 3-7% on measures of processing speed. There were no significant differences in the frequency of neurocognitive impairment at baseline or neurocognitive decline after 4 months between melanoma and non-melanoma patients. There were no significant differences in rates of cognitive decline between patients who exhibited impairment at baseline and those who did not, except on the Trail Making Test Part B (TMTB). Patients with neurocognitive impairment at baseline were more likely to decline on the TMTB, χ^2 (2, N=31) = 10.77 value, p=.005.

Conclusions: These results are consistent with the adverse neurocognitive effects of brain metastases on cognitive function. Further, acute neurocognitive decline after SRS in patients with 4-20 brain metastases underscores the need for additional brain preservation mitigation strategies. Long term monitoring of neurocognitive status is ongoing and will help to identify patients at risk for long term, late, and progressing neurocognitive decline.

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40 Long-Term Cognitive Safety of CAR T-Cell Treatments

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Objective: CAR T-cell treatment are profoundly changing the standards of care in Hematology and particularly that of B-cell lymphomas and acute lymphoblastic leukemias. However, this new therapeutic class induces a significant number of acute neurotoxicity in the initial period, characterized in more than half of the cases by cognitive disorders, often severe, such as aphasia, apraxia, executive disorders, memory disorders etc…
Currently, there is little data concerning long-term cognitive safety.
Objective: To evaluate long-term cognitive safety, in a series of adults treated with CAR T-cells.

Participants and Methods: Patients treated in a single center with CD19-targeted CAR T-cells for a relapsing B-cell lymphoma were prospectively followed-up.
Before CAR T-cell infusion, all patients underwent
- neurological examination, and brain MRI
- neuropsychological testing: MMSE, Boston Diagnosis Aphasia Examination (repetition and writing subtests), Rey-Osterrieth Complex Figure (copy and recall), Trail Making Test-A and B, Digit Span (forward and backward), Stroop Test, French version of the Free and Cued Selective Reminding Test, naming task of 80 images, and Mahieux gestural praxis battery and filled out self-questionnaires: Hospital Anxiety and Depression Scale (HADS), State Trait Anxiety Inventory (STAI), and Prospective and Retrospective Memory Questionnaire (QMRP)
Patients surviving without lymphoma progression were re-evaluated similarly, 2 years later.
Statistical analysis: Neuropsychological tests scores and clinical examination were compared before and after re-injection of CAR T-cells
- 1st analysis: comparison of cognitive performances before and 2 years after the infusion for all disease-free participants with a non-parametric paired comparison (Wilcoxon test as acceptance of normality was not respected).
- 2nd analysis: comparison of cognitive performances 2 years after the infusion between participants who had initial neurotoxicity and participants who had not, with a non-parametric analysis for independent groups (Mann-Whitney U).
- 3rd analysis: non-parametric paired comparison (Wilcoxon test) for self-administered-questionnaire measures (depression, anxiety and cognitive complains).
All statistical analyses were performed using Jamovi software (Version 1.2) and GraphPad Prism.

Results: Prospective cohort of 56 consecutive adult patients treated with CAR T-cells:
-19 patients (10M, 9F, median age 69 yrs (26-72)) eligible for long-term evaluation at 2 years.

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-11 patients had acute neurotoxicity including cognitive signs in the days following the infusion
In all 19 patients, neurological examination and brain MRI on long term evaluation were similar to baseline.
Cognitive assessments showed no significant deterioration when compared to baseline, in any cognitive functions assessed (verbal and visual memory, executive functions, language and praxis), even in patients who developed acute neurotoxicity.
In self-assessment questionnaires, HAD scores for anxiety and depression were significantly lower at 2 years than at baseline as QMRP and STAI remained stable.
Conclusions: In this cohort of patients treated for lymphoma with CD19-targeted CAR-T cells, we found no evidence for cognitive toxicity, 2 years after treatment, even in patient who had neurotoxicity after infusion.
This result is particularly important given the widespread use of this type of treatment in the years to come, in Hematology and Oncology.

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41 Higher-Order Cognitive Functions in Low-Grade Glioma Patients

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Objective: Patients with low-grade gliomas (LGG), who underwent resective surgery and, who are eligible for proton therapy, generally function well at the time of diagnosis and have a favorable prognosis. However, LGG can have a negative impact on the cognitive functioning of patients. Specifically, impairments in higher-order cognitive functions, namely executive functions and social cognition, are currently considered a major cause of disability. Therefore, the aim of the present study was to investigate higher-order cognitive functions in patients with LGG. The second aim was to examine the relationship between impaired higher-order cognitive functions and both tumor location and tumor volume.

Participants and Methods: Patients with LGG admitted to the University Medical Center Groningen (UMCG) between November 2017 and January 2021, selected for proton therapy, were included in this study. Patients were assessed with tests measuring executive functions (Zoo Map Test, Key Search Test, Trail Making Test, Letter Fluency) and emotion recognition (Facial Expressions of Emotion Stimuli and Tests). Performances below the tenth percentile or a profile score ≤ 2 in case of the Zoo Map Test and Key Search Test were considered to be impaired.
Results: In total, 73 patients (47% women; 41 ± 12 years old) with LGG were included. 40% of LGG patients were impaired on one or more tests for executive functions. 26% of patients were impaired on a test for emotion recognition. Correlational analyses showed that patients with larger tumors had significantly lower scores on overall emotion recognition, specifically for the expressions ‘Disgust’ and ‘Fear’. Furthermore, there were no significant differences for the comparison of frontal, temporal and ‘other’ tumors, for mean scores on tests for executive functions and emotion recognition.
Additionally, we found that recognition of the expression ‘Surprise’ was significantly worse for patients with left hemisphere tumors compared to those with right hemisphere tumors.
Conclusions: This is the first study that showed 26-40% of patients with LGG, selected for proton therapy, have impairments in higher-order cognitive functions. Moreover, the present study showed that larger tumors are associated with poorer recognition of emotions. However, no direct association between tumor location and higher-order cognitive functions was found. Considering the importance of higher-order cognitive functions in daily life functioning, neuropsychological examination in an early stage is crucial to inform and alert patients and clinicians on the status of higher-order cognitive functions, despite the relatively favorable prognosis.

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42 Emotion Recognition in Low-Grade Glioma Patients Before and After Surgery

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Objective: In patients with low-grade gliomas (LGG), deficits in several neurocognitive domains have been found based on previous literature. Interestingly, social cognition has barely been investigated, while it is acknowledged as an important neurocognitive domain and shown to be crucial for adequate interpersonal functioning. Social cognition is the ability to process social information and react adequately in social situations, with facial emotion recognition as a vital aspect. It is unclear whether emotion recognition is impaired in patients with LGG. The aim of the present study was twofold: firstly, to investigate the sole role of the tumor in possible emotion recognition deficits and secondly, to investigate the effect of resection on emotion recognition. Therefore, emotion recognition was examined both pre- and postoperatively. Subsequently, in the case of pre-surgery impairments, the relationship between emotion recognition and both general cognition and tumor location was considered.
Participants and Methods: Patients with LGG who underwent resective surgery were included in this study, and completed a neuropsychological test battery before (N = 30) and at least two months after surgery (N = 26). The Facial Expressions of Emotion-Stimuli Test (FEEST, subtest Ekman 60 Faces Test) was used to measure facial emotion recognition (total score and scores for the six different emotions). General cognition (memory, attention, speed, executive functions, and language) was also measured. Mean FEEST scores of patients with LGG were compared with mean FEEST scores of a matched healthy control group (N = 63) and with normative data. Paired-sample t-tests and Wilcoxon's signed-rank tests were performed to assess differences in emotion recognition scores over time (pre- to post-surgery). Between-group comparisons and correlations were used to investigate associations with general cognition and tumor location.
Results: Before surgery, patients performed significantly worse on the FEEST total score and FEEST Anger score compared to healthy controls. Compared to normative means, 26.7% of all patients showed an impairment in emotion recognition before resection, and 19.2% was impaired after resection. Paired comparisons showed no significant differences between scores on the FEEST before, and scores on the FEEST after surgery. No significant correlations with measures for general cognition and tumor location were found.
Conclusions: This study shows impairments in emotion recognition in patients with LGG before glioma resection, that did not change afterwards. This supports the hypothesis that the tumor itself contributes significantly to social cognitive dysfunction. Furthermore, the impairment in emotion recognition could not be explained by deficits in general cognition and was not related to tumor location. Consequently, incorporating tests for emotion recognition into neuropsychological assessment of all patients with LGG is important, as it is crucial for appropriate psychoeducation.

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43 Descriptive Study of Knowledge About Epilepsy in People with Epilepsy

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Objective: The training and psychoeducation of patients is an important element in analysing the quality of health care. Epilepsy is characterized by great uncertainty in people with this disorder and their families due to the lack of knowledge they have about it. This incertainty impact directly in their quality of life and could affect their cognitive profile. The objective of this research is to know the beliefs and knowledge that people with epilepsy have about epilepsy.
Participants and Methods: In this study, 75 people with epilepsy participated with a mean age of 37 years (SD = 15.02). Furthermore, the mean monthly seizures were 9 and the mean duration was 17 years. 52% had generalized seizures and 29.3% focal seizures. To measure knowledge of epilepsy, the Epilepsy Knowledge Questionnaire was adapted to Spanish (Mameniskiene et al., 2015). This questionnaire has 21 items with yes or no answers on general aspects of epilepsy. The data were analyzed with the JASP program using a binomial test for each item for the proportion 0.5.
Results: The participants showed 76.19% correct answers (M = 16.73; SD = 2.04). The binomial test yielded a higher proportion of correct answers than 50% in 17 questions, while four questions showed an expected proportion of correct answers due to chance.
Conclusions: The results reveal an adequate knowledge about the disease in people with epilepsy. There are no important misconceptions nor myths about it. Increasing the knowledge about epilepsy would actively contribute to the elimination of stigma and the increase in the quality of life of these patients.

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44 Sleep disorders and executive functions in people with epilepsy

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Objective: the general objective of the study is to analyse the effect of sleep disorders on executive performance in people with epilepsy and cognitive impairment. As specific objectives, it is proposed to describe the sample subjective sleep satisfaction and the existence of insomnia and hypersomnia, in addition to describe the type of epilepsy and the type of epilepsy seizures. Furthermore, it is proposed to analyse the quality of life in people with epilepsy and cognitive impairment and its relation with the sleep disorders. Regarding the executive functions, it is proposed to analyse the effect of sleep disorders on the visual and verbal working memory, the phonetic and semantic verbal fluency, the inhibitory control, the cognitive flexibility and the planning capacity.
Participants and Methods: A simple prospective ex post facto design was carried out with a sample composed of 8 volunteers with epilepsy and cognitive impairment. The volunteers were selected through the Andalusian Association of Epilepsy, Ápice (Seville, Spain). Non probabilistic convenience sampling as well as inclusion and exclusion criteria were applied. The volunteers signed consent to participate in the study.
Two groups were formed according to whether they had good or poor sleep quality according to the global Oviedo Sleep Questionnaire (OSQ) scores. Executive performance and quality of life were compared between the two groups. The instruments used to evaluate the sleep quality, the cognitive impairment and the quality of life were Oviedo Sleep Questionnaire, Montreal Cognitive Assessment (MoCA) and Quality of Life Epilepsy Inventory (QOLIE-10), respectively. Moreover, a questionnaire about sociodemographic and clinical aspects was applied. The executive performance was measured by Digit span subtest (WAIS-IV), Spatial Span of the Wechsler Memory Scale (WMS-III), Five Digit Test (FDT), Rey Complex Figure Test (CFT-R), and Controlled Oral Word Association Test (COWAT).
Results: Regarding the sleep quality in the sample, 37,5% showed medium-low subjective sleep satisfaction, 35% moderate-severe insomnia and 75% moderate-severe hypersomnia. Results reflected poorer performance in cognitive flexibility, inhibitory control (FDT) and verbal (WAIS-IV inverse digits subtest) and visual working memory (Corsi cubes of the WMS-III), in the group of poor sleep quality. The group with good sleep quality showed poorer performance in verbal fluency (COWAT) and planning (copying style of the CFT-R), in addition to a poorer quality of life (QOLIE-10). However, the results were only statistically significant on planning.
Conclusion: Results about lower performance in cognitive flexibility, inhibitory control and working memory in the poor sleep quality group are consistent with previous studies. Whereas the literature about the verbal fluency and planning are controversial, some studies presented similar results as the present study. As for, quality of life, the results contrast with previous research, which shows that poor sleep quality affects quality of life. It is concluded that despite the non-statistically significant results, differences could exist by increasing the sample size.

45 Impairments in the Theory of Mind in Patients with Epilepsy: Systematic Review and Meta-analysis

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Objective: The Theory of Mind (ToM) is the ability to interpret behavior by referring to mental states, allows to understand other individuals with the use of non-explicit data being aware of cognitive and emotional states, favoring social development. Despite of the clear conceptualization, there is a great variability in its evaluation which hinders a consensus in its understanding and specific characterization of the alterations in different pathological entities. For example, epilepsy, where deficits have been reported in this domain dependent on the syndrome and the epileptogenesis focus. This review aims to present the state of the art on the main affectations generated by epilepsy in the ToM according to its lobular origin location and considering the taxonomy that has been described in the ToM (attribution of emotions, desires, intentions, percepts, knowledge, beliefs, and mentalistic understanding of non-literal communication).

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Participants and Methods: The information search was conducted according to the criteria of PRISMA-P (2015) in 8 databases in English, Portuguese and Spanish, including cross-sectional studies, comparing adult patients with epilepsy and control groups. We obtained 26 articles for review and 19 for the inclusion of data in the meta-analysis, all met the methodological quality criteria evaluated according to the Dows and Black (1998) checklist modified by Stewart (2020).
Results: Seven components of ToM are considered in the papers reviewed, three of them were not evaluated in any study (attribution of desires, percepts, and knowledge); the attribution of emotional states is reported mostly affected in right temporal and mesial temporal lobe epilepsy (MTLE). There is a hypomentalization of intentions in the MTLE regardless of lateralization, the attribution of beliefs is reported impaired mainly in right temporal epilepsy and understanding of non-literal communication in temporal epilepsy without consistency in the relationship with the laterality of this. Regarding to meta-analysis, the total integrated clinical population was 656 and for control groups were 983. The data analysis highlights that the recognition of emotions is more compromised in frontal epilepsy (MD=-5.09 {-7.0, -3.18} p=0.00001, I^2=0% p=0.95) compared to controls and MTLE, recognition of faux-pas in frontal epilepsy (MD=-0.64 {-1.14, -0.14} p=0.01, I^2=81% p=0.001) in comparison to temporal lobe epilepsy in both lateralities focus and faux-pas comprehension measurement in bilateral temporal epilepsy (StMD=-2.14 {-2.86, -1.42} p=0.00001, I^2=0% p=0.96) compared to temporal lobe epilepsies with unilateral origin.
Conclusions: The data collected allow to quantitatively analyze the alterations of ToM in epilepsy in only two of its domains (attribution of emotions and understanding of non-literal communication) reflecting the lack of integrity and globality in its evaluation. The alteration was clear in the pathology compared to the normotypic population, predominating in frontal and bilateral temporal lobe epilepsy. It is necessary to explore the performance of ToM in epileptic patients, including the domains not reported in the papers reviewed (attribution of desires, percepts, and knowledge), which will contribute to obtain a quanti and qualitatively profile of ToM in epilepsy depending on its focus location, generating guidelines for its evaluation and specific resources for the cognitive intervention programs.

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46 Learning Capacity Distinguishes Impairment in Patients with Stereo-EEG Confirmed FLE and TLE

Nicholas Murray[1,2] , Mitchell Byrne[1] , Anthony Kneebone[3,4] , Lisa Gillinder[5] , Petra Graham[6] , Greg Savage[1]

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[6]School of Mathematical and Physical Sciences, Macquarie University, North Ryde (NSW), Australia

Objective: It has been well established that cognitive impairment is common in cases of epilepsy, and that the pattern of cognitive deficits can provide important insights about the suspected epileptogenic zone (EZ). While many studies have investigated cognitive impairment in temporal lobe epilepsy (TLE) and frontal lobe epilepsy (FLE), few have done so following stereo-EEG (SEEG) confirmation of the EZ. The current study aimed to review the cognitive profiles of patients with SEEG-confirmed TLE and FLE, to ascertain which measures of temporal and frontal function most accurately reflected epilepsy type and hemispheric seizure onset.
Participants and Methods: We analysed clinical neuropsychological data of 41 patients with either TLE or FLE (TLE = 27; FLE = 14), confirmed by SEEG evaluation between 2012 and 2021 at Westmead Hospital in Sydney or The Mater Hospital in Brisbane, Australia. Hemispheric language dominance was based on the findings of intracarotid amobarbital procedure (IAP Wada test), functional magnetic resonance imaging (fMRI), strong right-handedness or sufficient clinical evidence to suggest language dominance (e.g., preserved language following epilepsy surgery or speech arrest semiology). All participants were over the age of 18 (M=31.4) and had previously undergone comprehensive neuropsychological assessment, which included a formal estimate of premorbid intellect (via the TOPF, NART or GAI from the WAIS-IV), the Rey Auditory

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Verbal Learning Test (RAVLT), letter and category fluency (Controlled Oral Word Association Test; COWAT) and the Boston Naming Test (BNT). Performances across these tasks were normatively compared with the general population (i.e., z=0), as well as between epilepsy groups (TLE vs FLE). We also investigated the cognitive performance of patients with EZs in the language-dominant hemisphere vs the non-dominant hemisphere. Finally, we analysed performance in groups based on combined seizure laterality and epilepsy type (i.e., left-FLE, right-FLE, left-TLE, right-TLE). Our aims were investigated using both continuous (i.e., group z-scores) and categorical data (i.e., individual scores grouped based on clinically derived cut-off points of impairment; mild: z≤-1, moderate/severe: z≤-1.64).
Results: Compared with the general population, TLE patients performed worse across memory and executive measures at both the group and individual level, whereas FLE patients demonstrated a more typical profile of frontal dysfunction, with only learning capacity, letter fluency and naming impaired at both levels. When comparing the two groups, learning capacity (i.e., total of RAVLT Trials 1-5) appeared to be the only robust measure of frontal dysfunction, with FLE patients performing significantly worse at both the group and individual level. For the combined patient group there were no significant differences based on onset within language-dominant vs non-dominant hemispheres alone, but learning capacity was significantly worse in patients with language-dominant FLE than those with non-dominant FLE and both TLE groups.
Conclusions: Unlike previous studies, our study found that learning capacity was able to accurately distinguish between FLE and TLE patients. Furthermore, we demonstrated that impairment on this measure was localized specifically to the language-dominant frontal lobe, a finding that has important implications for the presurgical localizing value of neuropsychological assessment.

Symposium 03: Negative affect and neurodegenerative diseases: Recent progress and future directions

Chair: Elisa Di Rosa
Presenters: Elisa Di Rosa, Alberto Sardella, Alice Martini, and Caro Cools

16:30-17:50h
Thursday, July 7, 2022

SYMPOSIUM SUMMARY:

Negative affect and neurodegenerative diseases: Recent progress and future directions

Elisa Di Rosa[1]

[1]University of Padova

Neurodegenerative diseases, such as Alzheimer's and Parkinson's, have been the object of numerous neuropsychological studies in the last couple of years. Indeed, the rapid aging of the world population and the consequent increase in the prevalence of these age-related conditions, require immediate actions in order to improve diagnostic, treatment and, possibly, prevention strategies. However, despite the tremendous progresses made so far, one aspect of these diseases that is still lacking attention is the affective one. Indeed, while the cognitive and behavioral abnormalities in these disorders have been extensively studied, with research efforts also focused on the development of dedicated interventions, evidence concerning the impact of neurodegenerative disease on mood and affect are still scarce. This imbalance gives us an incomplete picture of these unfortunately always more frequent diseases, and therefore does not allow to make real progresses in their management and prevention strategies. Hence, with the present symposium we want to shed light on the affective side of pathological aging, presenting new evidence on 1) the impact of depression, anxiety and psychological distress in the manifestation of impulsive-compulsive behaviors of patients with Parkinson's disease, 2) the associations between depressive symptoms and cognitive performances in elderly outpatients with cognitive impairment, 3) the state and trait markers of Impulsive Compulsive Behaviours in Parkinson's and 4) progresses on the development of new treatment interventions for depressive symptoms in patients with Parkinson's disease.

01 Are affective disorders the first symptoms of cognitive impairment? Evidence in a sample of elderly outpatient

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Objective: The purpose of the present study was to investigate the associations between depressive symptoms and cognitive performance in a sample of elderly outpatients with early onset of cognitive impairment.
Participants and Methods: A sample of elderly subjects, who referred to the Geriatrics Outpatients Clinic of the University Hospital in Messina (Italy), were contacted between April and May 2021, and were asked to voluntarily undergo a remote evaluation. The remote evaluation was justified by the pandemic-related restrictions. Cognitive functioning, through the Mini Mental State Examination (MMSE), and depressive symptoms, through the SF-12 Mental Component Summary (MCS) were assessed, and they were compared to baseline data collected in the course of 2019. The MCS was considered as a measure of depressive symptoms, as previously suggested [1]. Elderly subjects were divided in two groups, based on the MCS cut-off score [2]; consistently, Group 1 included outpatients with a MCS score ≥ 42, Group 2 included outpatients with a MCS score < 42.
Results: 71 elderly outpatients were included in the current report (mean age 80.7 ± 6.20 years; 70% females). The follow-up MMSE score (mean 19.37 ± 4.54) resulted significantly reduced compared to the baseline score (mean 23.39 ± 3.91; $p<0.001$); similarly, the follow-up MCS score (mean 38.79 ± 14.84) resulted markedly reduced compared to the baseline score (mean 51.04 ± 10.88; $p<0.001$). Significant correlations were found between baseline MMSE and baseline MCS scores ($r= 0.214$; $p= 0.04$), as well as between follow-up MMSE and follow-up MCS scores ($r= 0.433$; $p= 0.003$). Elderly outpatients included in the Group 1 (N= 37) exhibited significantly higher scores of MMSE (mean 21.14 ± 3.57; $p= 0.02$), compared to subjects included in Group 2 (N= 34) (mean 18.35 ± 4.75). The same evidence was retrospectively found also for baseline data, with Group 1 showing higher MMSE score (mean 24.63 ± 3.04) compared to Group 2 (mean 21.38 ± 4.35), even though the difference was marginally significant ($p= 0.062$).
Conclusion: This study reported significant associations between depressive symptoms and cognitive performances in elderly outpatients with cognitive impairment; furthermore, subjects with greater depressive symptoms exhibited also lower cognitive performances over time. The follow-up evidence highlighted that depressive symptoms and cognitive performances appear to follow a parallel path. The association between depression and neurocognitive disorder, such as Alzheimer's disease, has been a controversial topic over the past decades [3]. Future studies are needed in order to better clarify the putative bidirectional nature of this link, with consequent relevant implication in terms of early diagnosis and interventions.

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02 Exploring state and trait markers of Impulsive Compulsive Behaviours in Parkinson's

Alice Martini[1] , Roberta Biundo[2,3] , Stefano Tamburin[4] , Roberta Schifano[4] , Luca Weis[2,3] , Elisa Mantovani[4] , Francesca Pistonesi[2] , Angelo Antonini[2] , Nicky Edelstyn[1]

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Objectives: The twin aims of the study were to examine the relationship between impulsive compulsive behaviours (ICB) in Parkinson's (PD) and: (i) 'state' executive function, motivation, negative affect and clinical features; (ii) trait predictors.
Participants and Methods: This cross sectional study recruited a total of 65 patients with PD were recruited, 32 patients had one or more ICBs+ and 33 patients were below the threshold for ICB- (Questionnaire for Impulsive-Compulsive Disorders in Parkinson's disease, **QUIP**).
Objective 1 was examined using the Go No Go test (GNG, false alarm rate) and the Stroop

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(interference errors), which provided estimates of inhibitory control and maintaining cognitive set, respectively. Motivation, reward seeking behaviour and negative affect were assessed by the Barratt Impulsivity Scale, the Kirby Monetary Choice Questionnaire (medium discount rates), and the Hospital and Anxiety Scale, respectively. For the clinical features we focused on age of onset, PD duration, The Unified Parkinson's Disease rating Scale part IV (UPDRS IV), and total levodopa equivalent daily dose total. Objective 2 was examined using a logistic linear regression model which included biological sex, education (years) and age of onset.
Results: Executive dysfunction, increased rates of impulsivity, reward seeking behaviour and negative affect were more marked in ICB+ compared to ICB-. Clinical markers were also more severe in the index group. Furthermore, ICB+ was marked by an (earlier) age of onset, more severe medication side effects (UPDRS IV) and reduced inhibitory control (GNG). Finally, accuracy of the ICB predictor model was 67.7%.
Conclusions: This study shows that as a group, ICB+ evidence distinct trait and state characteristics when compared to ICB-. However, despite recruiting a relatively large sample size, low power continues to negatively impact clinical application.

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03 Dancing and music therapy to improve well-being and depression in Parkinson's Disease

Caro Cools[1] , Sonja Kotz[1] , Nienke de Vries[1] , Annelien Duits[1]

[1]Department of Medical Psychology, Maastricht University Medical Center and Radboud University Medical Center Nijmegen, The Netherlands

Objective: In the present pilot study we explored whether well-being and depression in patients with Parkinson's Disease (PD) changed after participating in a music (1) or a dance intervention (2). Next, we explored whether there was a difference in changes of well-being and depression between both conditions.
Participants and Methods: We included PD patients participating in existing music and dance classes. A group of 8 PD patients in the dance group with a mean age of 63.88 (*sd* = 7.77) and 12 PD patients in the music group with a mean age of 62.50 (*sd* = 12.06) participated in this study. Both groups completed voluntarily the (online) questionnaires prior to and after the respective interventions, and it was aimed to match the two groups of participants based on demographic characteristics. To measure well-being, the Self-Compassion Scale (Nef, 2003) was used and to measure depression, the Beck Depression Inventory (BDI-II) was selected (Beck et al., 1996). A twelve-week intervention took place with the dance condition having a dance class of 60 minutes once a week, and the music condition having a music intervention twice a week for 30 minutes each. Dance classes were based on and inspired by the Dance for Parkinson Disease classes from the Mark Morris Dance Group and the Brooklyn Parkinson Group (https://danceforparkinsons.org/). The music in the music condition was the same as in the dance condition (60 minutes music for two sessions of 30 minutes a week).
Results: Based on non-parametric testing (Wilcoxon Sign Ranking Test) a significant decrease in depression was found in the dance group (z = -1,78, p < .05, r = -.45), whereas levels of well-being at time point 1 and 2 did not differ significantly (z = -.85, p = .23, r = -.21). Also in the music group non-parametric testing showed significance for depression (Z = -1.57, p = .06, r = -.32) and not for well-being (z = -.28, p = .40, r = -.06). Non-parametric testing (Mann-Whitney U Test) of differences between change scores (time point 2 – time point) in both conditions showed no significant results for depression (z = -.19, p = .45, r = -0.4) and well-being (z = -.81, p = -.81, r =-.18).
Conclusions: Due to the Covid-19 pandemic, the number of participants could not be increased during the study but based on the results so far, extension of the above study seems justified. In this future study, we aim at a holistic approach specifying individual parameters, i.e., motivation and cognition, to predict responders and non-responders. The focus will be on dancing only and we will use both a quantitative and qualitative approach. The strength of this design is that it pursues an individual rather than a 'one size fits all' approach and as such may uncover the mechanisms by which dancing may improve mood and well-being.

Symposium 04: The Utilization of Wearable and Passive Technology in the Monitoring of Mental and General Health Status

Chair: Isaac Tourgeman

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Presenters: Jessica Frias, Brooks Peterson, Dayron Gonzalez, Stanley Chen

16:30-17:50h
Thursday, July 7, 2022

SYMPOSIUM SUMMARY:

The Utilization of Wearable and Passive Technology in the Monitoring of Mental and General Health Status

Jessica Frias[1] , Brooks Peterson[1] , Dayron Gonzalez[1] , Yanelee Perez-Haddock[1] , Stanley Chen[2] , Noah Okada[2] , Hector Cantu Bueno[2] , Rachel Park[2] , Yan Zheng[2] , Isaac Tourgeman[1] , Mercedes Balcells-Camps[2]

[1]Albizu University
[2]Massachusetts Institute of Technology

This symposium is a multicenter collaboration featuring Albizu University and Massachusetts Institute of Technology - Institute for Medical Engineering and Science (imes) discussing the use of wearable technology to monitor neuropsychological and general health in a non-clinical population. Our research group is comprised of collaborators from multiple institutions and countries such as the United States, Mexico, Jamaica, Puerto Rico, Spain and China to address the health needs in our communities by focusing on providing technological advances to underserved populations. The primary goal of this symposium is to outline a study that has been designed to assess the utility of wearable and passive technology for data collection. A secondary goal of this symposium is to provide future directions and advice for those clinicians who aim to incorporate this technology into their own patient care, feedback, and rehabilitation. A pilot study is proposed to assess how data gathered via technology platforms can inform clinical prediction and correlate to gold standard questionnaire measurements in a cohort of college students. The findings attained from the non-clinical pilot study will then be incorporated into a multiphase clinical study incorporating the use of wearable and passive technology for the health monitoring of clinical participants with a history of cardiovascular disease and neuropsychological symptomatology. As background for our pilot study we as a team have conducted a series of literature reviews to understand ideas such as digital phenotyping, public opinions on wearable technology, utility of technological data for monitoring psychological symptomatology, and the overall relationship between cardiovascular disease and mental health. Our research has been detailed in the four abstracts associated with this symposium with the intention of explaining the theory behind our pilot study and posing the questions to our empirical research aims to answer.

01 The Viability of Utilizing Wearable Technology for Digital Phenotyping

Jessica Frias[1] , Dayron Gonzalez[1] , Brooks Peterson[1] , Yanelee Perez-Haddock[1] , Stanley Chen[2] , Noah Okada[2] , Hector Cantu Bueno[2] , Rachel Park[2] , Yan Zheng[2] , Isaac Tourgeman[1] , Mercedes Balcells-Camps[2]

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Objective: Technology and novel data collection methods in health care and more specifically mental health are currently being underutilized and are still not completely understood. Digital phenotyping facilitates the use of passive and wearable technology in identifying specific factors that contribute to the presentation of neuropsychological and medical ailments in a clinical and nonclinical population. Furthermore, Digital phenotyping allows clinicians to monitor patients from a distance and identify situations that may warrant immediate intervention or further assessment. Such data would be vital in both preventative care and improving treatment outcomes. The aim of this study is to explore the viability of incorporating wearable and passive technology in the monitoring of nonclinical populations.
Participants and Methods: A literature search was conducted through PsychINFO, PubMed, EBSCOHost, JMIR, MDPI, SpringerOpen, IOP Science, Karger, and BioMed Central electronic journal databases. Search terms are as follows: behavioral phenotyping, heart rate variability (HRV), consumer health information technology, telehealth, mental health, psychiatric symptomatology, college epidemiology, passive data, and wearable technology. Inclusion criteria; (1) peer reviewed articles published between 2000-2019; (2) studies published in English; (3) studies that related to mental health, digital phenotyping,

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and smart technology intervention. A total of 12 studies met the inclusion criteria.
Results: Of the 12 studies reviewed, all of them reported increases in mental health needs among college students. Of these 12, 6 of them found intervention in early college students to be important for successful outcomes. Within the studies reviewed, 6 found a correlation between reduced stigmatization of mental health and an increase in help seeking behavior. Additionally, all 12 of the studies used self-report as the main method of data collection via multiple means (paper, smartphones, and websites).
Conclusion: In conclusion, there is a rich history of using smartphones to allow for self-reporting of symptoms. Advantages of self-reporting symptoms from a smartphone include minimization of recollection bias. Additionally, the monitoring of behavioral and cognitive aspects of individual functioning to identify changes or abnormalities can inform care and intervention in a way that has not yet been implemented. Combining self-report with behavioral, cognitive, and physiological monitoring can enable further research to be conducted on how these types of data are best collected via a smartphone, and their validity when compared to current clinical standards for data.

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02 Public Opinions on Wearable Technology

Brooks Peterson[1] , Yanelee Perez-Haddock[1] , Jessica Frias[1] , Dayron Gonzalez[1] , Stanley Chen[2] , Noah Okada[2] , Hector Cantu Bueno[2] , Rachel Park[2] , Yan Zheng[2] , Isaac Tourgeman[1] , Mercedes Balcells-Camps[2]

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Objective: With the increased utilization of wearable and passive technology for health monitoring, questions regarding public and patient opinion regarding the amenability of technology have risen. Assessing the likelihood of patient compliance and adherence is paramount to the utility of such innovation. In response to this a questionnaire was generated. The objective of this questionnaire would be to accurately and reliably predict the factors that influence the public's opinions on wearable technology. Such a questionnaire would be a valuable clinical tool in the implementation of technology aimed at increasing preventative measures, early diagnosis and individualized treatment.

Participants and Methods: A systematic review was conducted. Databases included; PsycINFO, ProQuest, GoogleScholar, and EBSCOHost. A variety of search terms were used including compliance, mental health, mobile, passive, CVD, mhealth, anxiety, depression, sensor data, sensor technology, and wearable data. The three inclusion criteria that all of the previously examined studies met was that they; (1) were peer-reviewed articles (2) were published between 2000 and 2022; (2) and were in English. Our 20 literature reviews gathered data from previous studies that met all of these criteria.
Results: Of the 20 studies examined, a majority of them found that in terms of predicting adoption and adherence to wearable technology, the best predictors were those that were internal for the participants. Incongruently to this far fewer studies showed that external goals like reminders, illnesses, social competition, behavioral health specialists, and peer perceptions were effective in increasing compliance. However, a larger proportion of these same studies found that the role of ease-of-use had a fluctuating influence on compliance unlike device reliability, software streamlining, and familiarity, which were seen to increase compliance. Concerns about the future of data privacy, participant device preference, and cultural beliefs were voiced by a small proportion of the studies examined.
Conclusions: Due to a dearth of information, there is a clear need to further assess opinion regarding the implementation of technological devices for the monitoring of health and mental health. The benefits of utilizing such technology include, ease of use, the accuracy and consistency with which the data can be collected, and cost efficiency. As it applies to neuropsychology, this data can be correlated with significant events in the patients life and provide more feedback to the clinician overseeing care, not only for assessment, but also for therapy and counseling. The next logical step for a supporting study would be to carry out a study that would produce a valid measure for assessing the public's opinions on wearable technology and to then, carry out an empirical study with a sample population and statistically analyze the wearably and mobily collected data. One of the prerequisites for this, however, would be the creation and normalization of an instrument that can reliably and accurately assess the public's opinions on wearables and the data that they are capable of collecting.

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03 The Utility of Passive and Portable Sensor Data for Monitoring the Symptomatology of Depression and Anxiety

Dayron Gonzalez[1] , Brooks Peterson[1] , Yanelee Perez-Haddock[1] , Jessica Frias[1] , Stanley Chen[2] , Noah Okada[2] , Hector Cantu Bueno[2] , Rachel Park[2] , Yan Zheng[2] , Isaac Tourgeman[1] , Mercedes Balcells-Camps[2]

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Objective: Mobile devices and smartphones have made technology in healthcare more accessible to patients with COVID-19, further expediting the integration of technology into healthcare. Traditionally, depression and anxiety are measured via self-report, personality assessments, or during a psychological evaluation with a mental health clinician. However, these methods of assessing symptomatology lack the benefits of today's technology. This study aims to explore the utility of passive and portable data collection in individuals with anxiety and depression.
Participants and Methods: A systematic literature search was conducted through Science Direct, PubMed, NCBI, and JMIR electronic journal databases for studies that were published between 2015-2021 using the following keywords: depressions, mobile health, digital phenotyping, mobile applications, mobiles phones, mobile health, passive EMA, psychiatric assessment, and mhealth. Inclusion criteria; (1) peer-reviewed articles published between 2015 and 2021; (2) studies published in English; (3) studies that use data sensors to monitor and measure the symptomatology of anxiety, depression, and cardiovascular health. A total of 15 studies met inclusion criteria.
Results: Of the 13 studies reviewed, all of them found at least some correlation between mobile phone usage and depressive symptomatology. Of these 13, 5 of the studies found a large correlation between GPS data and severity of depressive symptomatology. In contrast to this, one study found that, although people with depressive symptoms spend less time calling and texting others, they spend more time on their mobile phones. Another study states that individuals with depression let their phones ring for longer and have more missed calls. Within the studies reviewed, 6 found a correlation between usage and anxious symptomatology. Mobile phone utilization was found to be far less correlated with anxiety and, resultantly, is a weaker predictor of such symptomatology. The studies found that increased phone calls, speech presence, and social media usage were directly correlated with increased anxiety.
Conclusion: In conclusion, all research analyzed shows the significance of passive sensor data when screening individuals for emotional symptomatology. This is stated with the implication that Ecological Momentary Assessments (EMA) are used alongside the sensor data to give a comprehensive picture of the patient. Additionally, GPS data plays a central role in the ability to screen for symptomatology related to depression and anxiety due to location variability or lack thereof. Future research should focus on longer-term studies, that collect more passive data, and have larger sample sizes to ensure that full extent of and interaction between these pathologies can be understood. It should also be noted that other sensors such as ambient light and audio sensors displayed significant results, however, data on their ability to correlate to symptomatology is limited.

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04 Relationship Between the Methods of Monitoring Cardiovascular Disease and Mental Health

Stanley Chen[2] , Noah Okada[2] , Yan Zheng[2] , Hector Cantu Bueno[2] , Rachel Park[2] , Jessica Frias[1] , Brooks Peterson[1] , Dayron Gonzalez[1] , Yanelee Perez-Haddock[1] , Isaac Tourgeman[1] , Mercedes Balcells-Camps[2]

[1]Albizu University
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Objective: There is an increasing amount of evidence correlating the diagnosis of cardiovascular diseases with the development of mental health disorders. However, due to the limitations of traditional psychological assessment it has been difficult to identify specific symptoms that underlie the etiology of this correlation. Recent advancements in continuous monitoring technologies have expanded the clinical capacity to monitor and report the symptoms of these disorders, creating a robust literature of monitoring techniques. This study sought to examine the relationship between methods of monitoring cardiovascular disease and major depressive disorder to identify factors that contribute to the comorbidity of these conditions.
Participants and Methods: A scoping literature review was conducted through PubMed, WebOfScience, and JMRI electronic journal databases for studies that were published between 2001 and 2021 using the following keywords: depression, anxiety, sensing, mental

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health, biomarker, and wearable. Inclusion criteria; (1) peer-reviewed articles published between 2001 and 2021; (2) studies published in English; (3) studies that reported the symptomatology of anxiety, depression, or cardiovascular health. The results from these databases were then compiled and segmented using text-based segmentation analysis to distinguish the distribution of studies across the domains of inclusion. A total of 19 studies met inclusion criteria.
Results: Of the studies reviewed, 30% utilized heart rate variability (HRV) monitoring to track the progression of symptoms in major depressive disorder (MDD) or cardiovascular disease (CVD). One review found reduced HRV in patients comorbid with MDD and CVD measured through the use of ECG. A meta-analysis of patients with anxiety also noticed a reduction in HRV, similar to what had been found between MDD and CVD. Furthermore, several studies identified stress as a factor that reduced optimal cardiovascular health (CVH), with depression being associated with a reduction in CVH. Stress was identified to be associated with changes in sleep duration, physical activity, device usage through data collected from mobile sensors including the accelerometer, ambient light, gps and more.
Conclusion: These results indicate that the primary shared methods for monitoring MDD, CVD, and anxiety are the measurement of HRV, sleep duration, and physical activity. Understanding that the independent symptomology of these conditions results in the variance across these measurements can help characterize the relationship between these illnesses. Future research should seek to validate these methods of monitoring in clinical populations to understand how these factors are correlated throughout disease progression. These studies would help to describe the biological and behavioral mechanisms that mediate these disorders, enabling the application of sensing technology for monitoring, early diagnosis and prevention of these comorbidities.

Paper Session 14: Factors influencing cognitive deficits in schizophrenia

16:30-17:50h
Thursday, July 7, 2022

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01 Family aggregation of the Intelligence Quotient: understanding its role in first episode of psychosis

Nancy Murillo-García[1,2] , Jordi Soler[3] , Mar Fatjó-Vilas[4] , Rosa Ayesa-Arriola[1,2]

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[2]University of Cantabria
[3]University of Barcelona
[4]FIDMAG Research Foundation

Objective: The familiality (or familial aggregation) of a trait indicates the degree of resemblance among family members. The familiality of intelligence quotient (IQ) might be associated with the diversity of manifestations in first episode of psychosis (FEP). This study aimed to explore whether IQ familiality is related to premorbid, clinical and neurocognitive characteristics in FEP patients.
Participants and Methods: Individuals from 129 families participated in this study (129 FEP patients, 143 parents, 97 siblings). The individual IQ of all participants was estimated using the WAIS vocabulary subtest. Then, for each family, the intra-family resemblance score (IRS) was calculated as an index of IQ familiality. Families with IRS<0 were referred as "discordant", since scores below 0 suggest low familiality. Families with IRS>0 were denominated "concordant" because scores avobe 0 indicate high familiality. Based on the patients' premorbid IQ and their familial IRS, patients were subdivided using K-means cluster analysis.
Results: After two outliers with extreme measures of premorbid IQ and IRS were excluded, 127 FEP patients were assigned to four clusters.
"Low IQ discordant" (n= 33): FEP patients with a low premorbid IQ (M=80.45, SD= 5.05) whose families had heterogeneous IQ (IRS= -5.62, SD=9). On average, these patients deviated 13.06 points from their family-IQ (M= 93.52, SD= 8.02). These patients showed a statistically significant worse premorbid adjustment in childhood (p= 0.004), and a trend toward a worse premorbid adjustment in early adolescence (p= 0.074). In addition, they had significantly higher disability scores at baseline (p= 0.029). Their neurocognitive performance was the most impaired of all patients.
"Average IQ discordant" (n= 13): FEP patients with an average premorbid IQ (M= 96.53, SD= 3.15) belonging to families with heterogeneous IQ (IRS= -10.09, SD=4.96). These patients deviated significantly more than others from their relatives since their premorbid IQ was 14 points below their family-IQ (M= 110.54, SD =

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5.58). Compared to the cluster "low IQ discordant", patients in this cluster had a better premorbid adjustment in childhood (p=0.050). They showed a marked deficit on attention (p= 0.007).
"Average IQ concordant" (n= 52): FEP patients with an average premorbid IQ (M=98.55, SD= 4.78) that resembled their family-IQ (IRS=3.42, SD= 4), which was also average (M= 104.13, SD= 6.99). They had a significantly better premorbid adjustment in childhood (p=0.004) and lower disability scores (p=0.033) at baseline compared to other clusters. Although it did not reach statistical significance, they had better baseline global functioning than the rest.
"High IQ concordant" (n= 29): FEP patients with a high premorbid IQ (M=111.89, SD=4.89) that closely resembled their family-IQ (IRS=5.73, SD= 5.66), which was also high (M= 111.5, SD= 4.89). They completed more years of education (p=0.014) and had a better premorbid adjustment in childhood than cluster "low IQ discordant" (p= 0.030). This cluster had the lowest level of neurocognitive impairment among all patients.
Conclusions: FEP patients with low premorbid IQ and low IQ familiality showed more unfavourable premorbid characteristics than patients whose IQ resembled their relatives. The relationship between deviation from the family-IQ and poor premorbid childhood adjustment supports the neurodevelopmental hypothesis of schizophrenia.

02 Theory of mind as an Endophenotypic Marker in Schizophrenia Spectrum Disorders: Family Study

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Background: There are a limited number of studies which have evaluated ToM deficits among the siblings and parents of FEP patients.
Objective: This study aimed to evaluate ToM deficits and its correlates among FEP patients, their siblings, parents, and a HC group.
Participants and Methods: FEP patients (N = 167), their siblings (N= 97), their parents (N=135) and HC (N = 103) matched for age, gender, years of education were evaluated on ToM performance. Neurocognitive tests were applied to all the groups.
Results: Parents of FEP patients performed like the FEP patients, the HC performed the best, with siblings falling intermediate between parents and HC on the Eyes Test. There was negative correlation between the SC domain of ToM and various domains of the neurocognition tests in the parents' group. Lower level of GCF was associated with higher level of social cognitive deficits.
Conclusion: Deficits in ToM could be an important endophenotypic marker for estimating the risk of FEP in at-risk first-degree families (i.e., siblings and parents). Additionally, ToM deficits must be considered as an important objective for intervention amid the at-risk siblings to improve their outcome.

03 Examination of the Executive Dysfunction Hypothesis of Formal Thought Disorder in Schizophrenia

Pablo del Olmo[1,2] , Laura López-Araquistain[3] , Paola Fuentes-Claramonte[1,4] , Salvador Sarró[1,4] , Bibiana Sans-Sansa[1] , Jordi Ortiz-Gil[5] , Jesús J. Gomar[1,6] , Joana Rosselló[2] , Peter J. McKenna[1,4] , Edith Pomarol-Clotet[1,4]

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Objective: Formal thought disorder (FTD), speech that is difficult for the listener to follow, sometimes to the point of complete incomprehensibility, occurs in 25%–75% of patients with schizophrenia. It has been proposed that at least part of the phenomenon reflects underlying executive or frontal dysfunction. According to this proposal, impaired planning and monitoring lead to the speech of patients with FTD being poorly formulated and prone to errors during execution, which then go unnoticed by the patient and uncorrected. Factor analysis has shown that FTD can be further divided in two dimensions: 'fluent disorganization', that typically includes items such as tangentiality, derailment, incoherence, illogicality, circumstantiality, and loss of goal, and 'alogia', that has been found to load on poverty of speech and poverty of content of speech and less consistently on perseveration. Our aim was to examine the association between FTD and its two sub-

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dimensions with executive dysfunction, measured with an ecologically valid executive battery.
Participants and Methods: Sixty-six individuals (20 female, mean age = 38.49 years, SD = 10.05) with a DSM-IV diagnosis of schizophrenia participated in this study. All participants were younger than 65 years, without history of brain damage or neurological illness or alcohol and/or substance abuse in the last 12 months. All participants were under antipsychotic treatment and had a current IQ > 70 (estimated with four WAIS-III subtests: Vocabulary, Similarities, Matrix reasoning and Block Design).
FTD severity was assessed with the Thought, Language and Communication (TLC) scale, that offers a global score of FTD severity and the two sub-scores derived from factor analysis: alogia and fluent disorganization. Executive function was assessed with the Behavioral Assessment of Dysexecutive Syndrome (BADS) battery, that ecologically measures aspects such as cognitive flexibility, planning, problem solving or multitasking. Non-parametric partial correlation analysis was used to examine associations between BADS and TLC scores, controlling for IQ, in order to examine the correlations independently from the effect of general intellectual function.
Results: Participants had a mean IQ = 90.76 (SD = 14.23). Mean BADS total score was 78.67 (SD = 21.45). Global FTD severity was negatively associated with the BADS total score (rho = -0.46, $p < 0.001$). From BADS subtests, the highest correlation was shown for the Six Elements Test, that measures goal management and goal neglect (rho = -0.35, $p = 0.004$). Both FTD sub-factors were also similarly associated with BADS total score, although the correlation was higher for alogia (rho = -0.42, $p < 0.001$) than for fluent disorganization (rho = -0.35, $p = 0.004$).
Conclusions: These results support the dysexecutive hypothesis for FTD. The association with worse executive performance was found for global ratings of FTD and for its two sub-dimensions, although it was higher for alogia than for fluent disorganization. The highest association with FTD was found for the BADS subtest measuring goal neglect, which suggests that impaired goal management might be a core dysfunction leading to FTD symptoms.

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04 Moderators of Functional Outcome Improvement After Integrative Cognitive Remediation in Schizophrenia

Agurne Sampedro[1] , Javier Peña[1] , Pedro Sánchez[2,3] , Naroa Ibarretxe-Bilbao[1] , Nagore Iriarte-Yoller[2] , Cristóbal Pavón[2] , Mikel Tous-Espelosin[4] , Natalia Ojeda[1]

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Objective: Cognitive remediation is an effective non-pharmacological intervention in improving numerous domains including functional outcome in people with schizophrenia. However, little is still known about which are the possible factors that moderate the improvement in functional outcome after integrative cognitive remediation. Identifying the factors that explain a greater improvement produced by this type of intervention could be useful for the appropriate use of healthcare resources and for the development of a more personalized treatment plan. Therefore, the objective of the present study is to identify which characteristics of patients with schizophrenia moderate the improvement in functional outcome after integrative cognitive remediation.
Participants and Methods: The sample of the study included eighty-one patients with schizophrenia from the Mental Health Network from Álava (Spain). Patients were randomly assigned to either an experimental group who performed integrative cognitive remediation with the REHACOP program (n = 42) or to an active control group who performed occupational activities (n = 39) during 20 weeks (in sessions of 60 minutes, 3 days a week). The REHACOP program combined cognitive remediation with social cognitive training and social and functional skill training. The study included a comprehensive assessment of clinical symptoms, neurocognition, social cognition, and functional outcome at baseline and follow-up. Regression analyses were performed to identify which variables played a moderating role, using IBM SPSS version 27.0. The possible moderators included in the analyses were age, years of education, premorbid IQ, hospitalization status, baseline clinical symptoms, baseline neurocognitive and social cognitive functioning, and baseline functional outcome. Data about the effectiveness of REHACOP on cognitive, functional, and

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clinical data is provided in a previous study (Sampedro et al., 2021).
Results: Integrative cognitive remediation with the REHACOP program showed to be effective at improving multiple domains including functional outcome in patients with schizophrenia. Regression analyses showed that years of education (β = -.255, t = -3.061, p = .003), baseline social cognition (β = -.182, t = -2.087, p = .040), and baseline functional outcome (β = -.317, t = -3.576, p = .001) played a moderating role in the improvement of functional outcome after integrative cognitive remediation. Specifically, analyses indicated that the effect of the REHACOP on functional outcome was higher among those participants who scored lower in years of education and baseline social cognition and functional outcome. No significant interaction results were found with the rest of the variables.
Conclusions: Integrative cognitive remediation is an effective intervention that should be considered as a key treatment for patients with schizophrenia. These results suggest that patients with lower years of education and baseline social cognition and functional outcome may benefit more from the integrative cognitive remediation. Although patients with lower educational and cognitive levels are particularly vulnerable to suffer greater difficulties in daily functioning, it seems that this profile of patients may also benefit more from this type of interventions and, therefore, should be an important focus of health services. These results may provide evidence in favor of the differential susceptibility approach.

Symposium 05: Neuropsychological research in the Americas: From genes to brain, cognition, and everyday mental health

Sponsored by Asociación Latinoamericana de Neuropsicología (ALAN)

Chair: Dr. Mauricio A. García-Barrera
Presenters: Dr. Yaira Chamorro, Dr. Esmeralda Matute, Dr. Mónica Rosselli

18:00-19:20h
Thursday, July 7, 2022

SYMPOSIUM SUMMARY

In this symposium, members of the Asociación Latinoamericana de Neuropsicología (ALAN) will present their recent neuropsychological research studies involving adolescents, adults, and older adults, and utilizing traditional and novel neuropsychological methods for the examination of brain and cognition relationships, including genetic genotypification, structural neuroimaging, neuropsychological assessment, and ecological momentary assessment (EMA). Specifically, Dr. Chamorro from the Institute of Neurosciences at the University of Guadalajara will present a study examining the relationships between a polymorphism of the catechol-O-methyltransferase (COMT) gene called Val158Met and mathematical skills, specifically looking at the contributions of executive functions to those associations. Also from the University of Guadalajara's Institute of Neuroscience, Dr. Matute will discuss a longitudinal study examining memory and executive function change on a group of preclinical carriers of a mutation of the amyloid precursor protein (APP) associated with autosomal dominant AD (ADAD) and the valine to isoleucine amino acid substitution (V717I) versus non-carrier controls. Continuing with the theme examining typical and atypical aging, Dr. Rosselli from Florida Atlantic University will discuss a neuroimaging study looking at a series of associations between clinical diagnosis (from healthy aging to dementia), language experiences, and the volume of the corpus callosum and associated tracts in monolingual and Spanish-English bilingual older adults. To end, Dr. Garcia-Barrera from the Cortex Lab at the University of Victoria, will discuss a RCT study examining the effects of an 8-week physical activity training on the mental health of older adults, and specifically, data collected using a downloadable app designed for remote (online) EMA.

Paper Session 15: Cognitive and behavioural determinants of TBI

18:00-19:20h
Thursday, July 7, 2022

01 The Contributions of Foreground and Background Reward Sensitivity to Apathy after Traumatic Brain Injury

Halle Quang[1] , Campbell Le Heron[2,3,4] , Fiona Kumfor[5] , Bernard Bellaine[1] , Tuong-Vu Nguyen[6] , Truc-Quynh Nguyen[7] , My-Ngan

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Objective: Apathy, which refers to the impairment of goal-directed behaviour, is one of the most common and disabling problems after traumatic brain injury (TBI). While emerging evidence suggests that apathy is underpinned by reduced ability to process reward, the construct of reward itself is complex. In many real-world scenarios, reward can be categorised into foreground (what can be achieved at the moment) and background (what could be obtained in the broader environment) components. Understanding whether apathy is specifically driven by altered sensitivity to foreground and/or background reward is important as it will cast light on how therapeutic interventions of apathy can be developed. Despite this, the relationship between these reward components and apathy remains unclear. This study utilised an ecologically valid foraging model to investigate how abnormal foreground and/or background reward sensitivity contributed to apathy after TBI.
Participants and Methods: A patch-leaving style foraging task was administrated to 87 participants (25 TBI patients without apathy (TBI-A), 20 TBI patients with apathy (TBI+A) and 37 healthy subjects). In this virtual farming task, participants had 14 minutes to collect as much reward (milk from cows in fields) they could. Foreground reward rate was manipulated by fields that are different in the initial yield of milk (low, medium and high yield). In all fields, reward rate reduced exponentially. Therefore, the longer a participant remained in that field, the less milk they could collect per second. Background reward rate (environment) was manipulated by different proportions of low, medium and high yield fields. The poor environment included 50% low yield fields, 30% medium yield and 20% high yield, whereas the rich environment comprised 50% high yield, 30% medium yield and 20% low yield fields. Based on the foreground and background reward rates, participants decided when they should leave their current field.
Results: In general, there was a significant interaction between background reward rate and apathy on leaving time (p=0.003) whereas the interaction between foreground reward rate and apathy was not significant (p=0.38). The effect of background reward rate on apathy was specifically seen in TBI+A individuals who exhibited hyposensitivity to background reward rate changes. The TBI+A group also achieved a smaller proportion of milk collected at the end of the task than the TBI-A group in the rich environment (p=0.046, 74% vs 83%).
Conclusions: This study is the first to demonstrate the relationship between foreground-background reward sensitivity and apathy in a neurological condition. Our data suggest that apathy was underpinned by reduced background, but not foreground, reward sensitivity. Theoretically, these findings provide evidence for the dissociable effects of foreground and background rewards. From a clinical perspective, strategies that focus on improving the ability to process background reward values are potential to manage apathy after TBI, therefore improve patients' independence and quality of life.

02 Task-Induced Subjective Fatigue and Resting-State Striatal Connectivity Following Traumatic Brain Injury

Jessica Bruijel[1,2] , Conny Quaedflieg[1] , Tobias Otto[3] , Vincent van de Ven[4] , Sven Stapert[1,2,5] , Caroline van Heugten[1,2,6] , Annemiek Vermeeren[1]

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Objective: People with traumatic brain injury (TBI) often experience fatigue, but an understanding of the neural underpinnings of fatigue following TBI is still lacking. This study used resting-state functional magnetic resonance imaging (rs-fMRI) to examine associations between functional connectivity (FC) changes and task-induced changes in subjective fatigue in people with moderate-severe TBI.
Participants and Methods: Sixteen people with moderate-severe TBI and 17 age, gender, and education matched healthy controls (HC) performed an adaptive N-back task (working memory task) to induce cognitive fatigue. Before and after the task they rated their state fatigue level and underwent rs-fMRI. Seed-to-voxel analyses with seeds in areas involved in cognitive fatigue, namely the striatum and default mode network (DMN) including, medial prefrontal cortex and posterior cingulate cortex, were performed.
Results: The adaptive N-back task was effective in inducing fatigue in both groups. Similar associations between task-induced subjective fatigue and DMN FC were found across the groups. Subjective task-induced fatigue was positively associated with FC between striatum and precuneus in people with TBI, while there was a negative association in HC. In contrast, subjective task-induced fatigue was negatively associated with FC between striatum and cerebellum in the TBI group, while there was no association in HC.
Conclusions: Our results suggest that people with moderate-severe TBI and HC showed similar alterations in DMN connectivity with the experience of subjective fatigue while differing in striatal connectivity with the experience of fatigue. Further knowledge of striatal connectivity as a neural correlate of fatigue could increase our understanding of the mechanisms behind fatigue in people with TBI and maybe assist in the diagnosis of fatigue. Furthermore, these findings might contribute to the development of treatments for fatigue following TBI aimed at abnormal striatal connectivity.

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03 Fatigue After Mild Traumatic Brain Injury: Association with Mood, Life Events, and Alcohol Consumption

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Objective: Although fatigue is one of the most frequently reported symptoms following mild traumatic brain injury (mTBI), it remains poorly understood. Aim of the present study was to examine level and correlates of postinjury fatigue at 3 months in a prospectively recruited cohort of patients with mTBI, and to compare these with a group of patients with lower-extremity orthopedic injury (OI).
Participants and Methods: One hundred patients with mTBI (aged 18-68 years) and 34 patients with OI completed The Barrow Neurological Institute Fatigue Scale (BNI-FS), Beck Depression Inventory – Second Edition (BDI-II) and Visual analog pain rating (P-VAS) at three months after injury. Information on recent life events and post-injury alcohol consumption were collected through structured interview. Primary injury-related data were recorded at emergency department (ED) and included presence and duration of post-traumatic amnesia (PTA), loss of consciousness (LOC), and whether patient had been under influence of alcohol when presenting to ED. All participants underwent brain structural MRI scanning (3T, Siemens Magnetom Verio).
Results: The two groups did not differ in their levels of self-reported fatigue (BNI total scores). Being under influence of alcohol at ED was associated with higher levels of fatigue at 3 months (Mann-Whitney $U=282$, $p<0.001$). No other significant relationships between acute injury characteristics (LOC, PTA, presence of injury related findings in MRI) were found. In the mTBI group, reporting more problems with fatigue was associated with more depressive symptoms ($r_s=0.574$, $p<0.001$) and pain ($r_s=0.269$, $p=0.007$), more recent life events ($r_s=0.270$, $p=0.007$), and greater post-injury alcohol intake ($r_s=0.273$, $p=0.006$). In the OI group, no significant associations between fatigue and the other self-report measures were found.
Conclusions: Levels of self-reported fatigue at 3 months were not elevated in patients with mTBI compared to OI controls. No associations between acute injury characteristics and fatigue at 3 months were found. Patient-related psychosocial factors, such as mood, life events, and alcohol consumption were associated with fatigue after mTBI. Our findings suggests that the role of psychosocial factors in post-mTBI fatigue warrants further study.

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04 Mental Fatigue after Traumatic Brain Injury: Different Determinants across the Severity Spectrum

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Objective: Fatigue is a frequent complaint after traumatic brain injury (TBI), irrespective of severity. We aimed to identify factors that contribute to mental fatigue in various severities of TBI by investigating the influence of impaired information processing, mental distress and coping styles.
Participants and Methods: In a retrospective chart review study, patients with mild (n=56), and moderate-severe TBI (n=25) were included, as well as a group of healthy controls (HCs; n=30). Neuropsychological assessment in the sub-acute to chronic phase after injury consisted of tests requiring information processing speed and questionnaires for fatigue, anxiety, depression and coping styles.
Results: In the moderate-severe TBI group, worse performances on three measures for basic and complex information processing speed were significantly correlated with higher levels of subjectively reported mental fatigue (correlations ranging from .40 to .50), but not to physical fatigue. In the mild TBI group, information processing speed and mental fatigue were not significantly related. However, presence of anxiety, depression and use of passive coping did significantly positively correlate with mental fatigue in this group (correlations ranging from .39 to .53).
Conclusions: Important differences in determinants of mental fatigue across the TBI-severity spectrum exist. Slower information processing in moderate-severe TBI is likely to pose a higher cognitive load in demanding (task)situations, which in turn relates to higher levels of mental fatigue. In contrast, reported mental fatigue in case of mild TBI appears strongly associated with mental distress and passive coping. These findings provide different targets for treatment when severity of injury is taken into account.

05 Cognitive, emotional and interpersonal determinants of loneliness and belongingness in brain injury survivors

Christian Salas[1,2] , Hector Ureta[3] , Alvaro Aliaga[1] , Osvaldo Castro[1] , Daniel Rojas[2] , Ramiro Cruces[1] , Jon Evans[4]

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Objective: Diverse studies have reported that loneliness is a common and pervasive problem amongst brain injury survivors during the chronic phase. It has been noted that loneliness - not size of network nor perceived level of social support- is a significant predictor of quality of life, emotional well-being and depressive symptomatology. However, there is little knowledge regarding why survivors can experience high levels of loneliness. The aim of this study was to systematically explore three hypotheses that have been separately proposed in the literature to account for this question, which suggests a potential role for changes in cognition (executive functions), emotion (emotional reactivity) and interpersonal life (internalized stigma and concealment). Another goal of this study was to explore the relationship between these variables and belongingness, a construct often described as the opposite of loneliness, but rarely considered in the ABI literature.
Participants and Methods: 103 ABI survivors and relatives that lived in the community participated in this study (Type of Injury: *Stroke* = 69, *TBI* = 17, *Other* = 17; Time since injury (months): *M* = 80,19, *SD* = 68.5). Questionnaires were administered to assess both the experience of loneliness (*UCLA Loneliness Scale*) and belongingness (*General Belongingness Scale*), as well as the level of executive impairment in everyday life (*Frontal System Behavior Scale*), changes in emotional reactivity (*Perth Emotional Reactivity Scale*) and interpersonal problems (*Anticipated Stigma and Concealment Questionnaire*). The relationship between loneliness and belongingness was explored by calculating the pairwise Spearman correlation coefficient. Two separate multiple linear regressions were employed to analyze the contribution of cognitive, emotional and interpersonal changes

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(predictors) to the experience of loneliness and belongingness (outcomes).
Results: A large inverse association was found between the experience of loneliness and belongingness (r = -.58; p = .00), supporting the hypothesis that these are interrelated constructs. Results from the multiple linear regressions showed that cognitive, emotional and interpersonal variables explain a significant proportion of loneliness (R^2 = .58) and belongingness (R^2 = .34) variance. Interestingly, only negative emotional reactivity (r = .60; p < *.001*) and anticipated stigma (r = .25; p = .001) were significant predictors for the experience of loneliness. In contrast, negative emotional reactivity (r = -.41; p < *.001*), anticipated stigma (r = -.19; p = .004) and executive dysfunction (r = -.19; p = .003) were all significant predictors for the experience of belongingness.
Conclusions: Data from this study suggests that loneliness/belongingness is a complex construct, closely related to cognitive, emotional and interpersonal changes that commonly occur after brain damage. This study contributes to the development of a theoretical framework that can guide the assessment and treatment of loneliness after brain damage. These results support authors that have pointed at the limitations of addressing loneliness after brain injury by exclusively enlarging the social network or increasing opportunities for social contact. Individual Interventions that aim at managing negative emotional reactivity, as well as modifying negative interpretations of social interaction appear necessary to include. Public education about brain damage could be a particular important intervention to decrease stigma.

Symposium 06: Impact of cultural diversity on neuropsychological assessment and rehabilitation

Sponsored by the INS Student Liaison Committee

Panelists: Jon Evans, Alberto Fernandez, Skye McDonald

18:00-19:20h
Thursday, July 7, 2022

Paper Session 16: Neuropsychology of Epilepsy

18:00-19:20h
Thursday, July 7, 2022

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01 Verbal Episodic Memory In Children Undergoing Focal Epilepsy Surgery

Enric Bellido Castillo[1] , Anna López Sala[1] , Javier Aparicio Calvo[1] , Daniel Cuadras Pallejà[1] , Andrea Palacio Navarro[1]

[1]Hospital Sant Joan de Déu de Barcelona

Objective: Left temporal lobe epilepsy is associated with verbal memory impairment in adults usually related to hippocampal damage. The fact that verbal memory is not always impaired in left temporal lobe resections in children suggests that epileptogenic activity in early life leads to the development of bilateral memory representation due to the disordered or disrupted reorganization of the memory lateralization system.
Participants and Methods: The present study aims to analyze the surgery effects on verbal episodic memory outcome in a sample of pediatric patients with drug-refractory temporal lobe epilepsy. Pre-OP and 1-year follow-up post-OP verbal episodic memory scores from 25 pediatric patients who underwent temporal lobe epilepsy surgery were extracted from the Sant Joan de Déu Hospital database and analyzed retrospectively in view of finding whether there were significant performance differences, taking into account several demographic and clinical factors such as sex, laterality of epilepsy, age at seizures onset, age at surgery, duration of the epilepsy and presurgical performance status. The sample was separated into two groups in terms of epilepsy laterality (left, n=11; right, n=14) and special attention was paid to those patients with left-sided epilepsy who underwent left hippocampus resection (n=4).
Results: We did not find significant differences in pre-operative performance between left- and right-sided epilepsies. Before undergoing surgery, age at onset of seizures showed a high negative correlation (rho= -0.72, p=0.01) with long-term verbal memory performance only when the temporal lobe epilepsy was left-sided. Overall, no significant improvement was found 1 year after surgery. In average terms, the patients who underwent left hippocampus resection showed a small additional decline after surgery whereas its sparing led to a modest improvement, but not statistically significant. Surgery age showed a negative moderate correlation with long-term verbal memory scores in right temporal lobe epilepsies (r=-0.56, p=0.04). Intact pre-operative verbal memory showed a slight slide towards significance

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(t=1.37, p=0.20, d=0.86) to be a risk factor for post-operative decline.
Conclusion: Our results are quite consistent with previous studies about verbal episodic memory. There seems to be no performance differences between left- and right-sided temporal epilepsies before surgery when seizures onset at early development stages, likely due to a more efficient reorganization and consolidation process of verbal memory system in the contralesional hemisphere. A 1-year follow-up does not seem to be enough time to appreciate significant changes in verbal memory performance after surgery. Left temporal lobe surgery is more likely to cause an additional verbal memory decline when the left hippocampus is resected, according to previous literature. The improvement in right temporal lobe epilepsies seems to be greater when patients undergo surgery earlier, probably due to a younger age at the time of seizures release/reduction and withdrawal of AEDs that may enhance cognitive development. Finally, patients with an average or above average pre-operative performance appear to have an increased risk for post-operative decline, in line with previous research.

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02 Subjective and Objective Memory Change After Epilepsy Surgery: Role of Seizure Outcome and Depressive Symptoms

Florian Muecke[1,2] , Marc Hendriks[2,3] , Christian Bien[1] , Philip Grewe[1]

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Objective: Complaints related to memory functioning are among the most commonly reported cognitive symptoms after epilepsy surgery. However, research suggests a considerable mismatch between patients' perception of memory functioning and the objective performance as measured with standardized neuropsychological tests. Depressive mood might be an important factor in explaining this discrepancy, though other variables have also occasionally been reported as relevant. There are mixed results as to which amount of impact these factors play in determining the overall quality of life (QoL) of patients with epilepsy. As a new approach, the present study aimed to quantify the mismatch between subjective and objective memory functioning by considering the dynamic change of these factors as well as depressive symptoms after epilepsy surgery. Moreover, the influencing factors of subjective and objective memory change were investigated as well as their effects on the overall QoL.
Participants and Methods: Pre- and postoperative (24 months) data from 78 patients with focal epilepsy (28% extratemporal) were retrospectively analyzed. Data from standard neuropsychological assessment included verbal memory capacity and self-ratings of subjective memory, depressive symptoms, as well as postoperative QoL.
Results: The results showed that (1) patients with clinically relevant postoperative depressive symptoms underestimate their memory performance; (2) for non-seizure-free patients, a postoperative decrease in depressive symptoms was associated with a tendency to underestimate memory decline; (3) the relationship between objective memory change and QoL is mediated by the factors subjective memory change and depressive mood.
Conclusions: Our data demonstrate a quantitative approximation of a pronounced depression-related negative biased self-perception of memory functioning of approximately 1 to 1.5 standard deviations. At the same time, our data indicate that patients' perceptions of memory functioning can be quite accurate in the absence of depressive symptoms. Moreover, it seems that patients who are relieved of having recurrent epileptic seizures are less influenced by depressive symptoms when judging their memory change. Subjective perception of memory performance and depressive mood may also critically determine if objective memory changes contribute to patients' postoperative QoL. Taken together, our study highlights the clinical relevance of incorporating subjective measures of memory functioning and mood that go beyond objective memory performance to assess how changes in memory may affect patients' QoL after epilepsy surgery.

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03 The Impact of Mood on Neuropsychological Test Performance in Epilepsy

Sallie Baxendale[1]

[1]UCL Queen Square Institute of Neurology

Objective: Whilst there is a large literature looking at the impact of induced anxiety states

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on cognitive performance in experimental paradigms, few studies have directly examined the ways in which anxiety and low mood influence performance on neuropsychological tests administered in a clinical setting. As a result little is known about the quantitative impact of anxiety and low mood on performance in specific cognitive domains in people with epilepsy, or the cumulative impact of mood disturbance on test scores obtained in clinical settings. In addition, it is unknown whether anxiety and low mood have a differential impact on cognitive performance in different groups of people with epilepsy. The aim of this study was to examine the impact of anxiety and low mood on tests of memory, language and intellectual function in different groups of people with epilepsy to provide an empirical basis for the interpretation of neuropsychological test scores in these patient populations.

Participants and Methods: 1,540 adults with epilepsy completed the Hospital Anxiety and Depression Scale (HADS) and a broad battery of standardised tests of intellectual, language, memory and executive functions. 782 patients had unilateral temporal lobe epilepsy (n=366 Right TLE: n= 416 Left TLE); 160 patients had frontal lobe epilepsy (FLE) and the remaining 598 patients had seizures arising from elsewhere, multifocal seizures or an unclear focus (Mixed Group). All groups had a mean age in their thirties and did not differ in the age of onset of seizures.

Results: In the group as a whole (n=1540) 47% reported elevated levels of anxiety (Mild 19.4%, Moderate 19%, Severe 8.6%). 24.2% reported elevated levels of depression (Mild 14.4%, Moderate 7.9%, Severe 2%). There were no differences between the epilepsy groups in their mean scores on the anxiety or depression subscales of the HADS. Similarly, the groups did not differ in their distributions of scores between the mild/moderate/severe classifications on the anxiety or depression subscales. Regression analysis revealed significant epilepsy group by cognitive domain interactions in the impact of anxiety and depression on cognitive test performance. High levels of anxiety and low mood were associated with lower scores on tests of verbal reasoning, verbal memory and language tasks in the RTLE but not the LTLE group.

Conclusions: In RTLE patients, measures of anxiety and low mood account for a significant amount of the variance in test scores traditionally thought to be sensitive to dominant hemisphere disturbance, in particular naming and verbal memory skills. This pattern was not seen in the LTLE group where impairments in these domains reflected the underlying seizure laterality, rather than elevated levels of anxiety or depression. The influence of anxiety and low mood must be carefully considered in the interpretation of neuropsychological test data to avoid misinterpreting the lateralising significance of impairments in these domains, particularly in right TLE patients.

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04 Demand-dependent Psycholinguistic Phenotypes in Temporal Lobe Epilepsy: Circumstantiality Re-examined

Fiore D'Aprano[1,2] , Charles Benjamin Malpas[1,2] , Michael Martin Saling[1,3]

[1]The University of Melbourne, Melbourne, Australia
[2]Department of Neurology, The Royal Melbourne Hospital, Melbourne, Australia
[3]Department of Clinical Neuropsychology, Austin Health, Melbourne, Australia

Objective: Because of seizures and disturbances to cognitive-linguistic networks, individuals with Temporal Lobe Epilepsy (TLE) have impaired language at a psychometric and conversational level—manifesting as verbosity. The micro- and macrolinguistic underpinnings of this disturbance, and the role that epilepsy and cognitive variables play is yet to be comprehensively explored. Examination of high-level language has been largely overlooked in the TLE literature to date, particularly their discourse fluency, cohesion, and coherence. Demands on language production are thought to be influenced by type of discourse elicitation, where structure is presumed to provide adequate linguistic scaffolding to limit discourse disturbances. As such, this study involved epilepsy characterisation, neuropsychological assessment, and naturalistic discourse elicitation under different contextual demands to examine language phenotypes in TLE.¡

Participants and Methods: We examined the language output of 20 individuals with TLE compared to 14 healthy controls under separate conversational contexts—a highly structured, constrained, and predictable context (Cookie Theft), and an unstructured, unconstrained context hypothesised to be more vulnerable to the effects of verbosity (eliciting a description of a “Typical Day”). Participants underwent a comprehensive neuropsychological examination, and their language output was recorded and manually transcribed verbatim. These transcripts were coded for key linguistic features at the micro- and macro-linguistic level, with an inter-rater reliability of 90%, which

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were then subject to novel and detailed multi-level discourse analysis procedures.
Results: Findings suggest that a constrained context gives rise to microlinguistic disturbances in TLE, predominantly affecting the fluency of output, with more pauses, fillers, false starts, and disruptions of clarity. Under an unconstrained context, as anticipated, traditional aspects of verbosity emerge in TLE. They tend to deviate more from the topic of conversation—using more words, producing longer output, pausing more frequently and for longer duration, and being less concise and informative in the content they do communicate, i.e., they say more about less. Producing more units that are repetitive, redundant and not contributing to the progression of content is disruptive to coherence and represents a communicative issue. Disturbances to macrolinguistic elements such as cohesion and coherence emerge where there is less structure, and higher-level language planning and execution are grossly impacted. Network analyses suggest that these disturbances are closely linked with seizure characteristics and cognitive disturbances in word retrieval.
Conclusions: These findings may suggest that different psycholinguistic phenotypes emerge depending on the demands and linguistic challenges of the conversational context. The discrepancies characterising the unconstrained phenotype align closely with descriptions of TLE in a naturalistic clinical context, where patients are typically asked open-ended questions regarding their seizures, medications, and daily functioning. The unstructured nature of these questions speaks to the clinician's anecdotal reporting of verbosity in these patients, which often does not map onto standard psychometric assessment of single-word level impairments. These phenotypes reflect a dynamic linguistic system taking shape under specific contextual conditions. These findings provide necessary clinical insights into the language of individuals with TLE and the potential impact on daily communication demands, social and occupational functioning.

Symposium 07: Across cultures and languages: Neuropsychological assessment of patients with focal and neurodegenerative disease

Sponsored by the INS Cultural Special Interest Group

Co-Chairs: Franchesca Arias and Claudia Peñaloza
Presenters: Franchesca Arias, Brooke Hallowell, Mohamed Taiebine, Io Salmons, Marco Calabria

8:30-10:00h
Friday, July 8, 2022

SYMPOSIUM SUMMARY:

Across cultures: Neuropsychological assessment of patients with focal and neurodegenerative disease

Franchesca Arias[1] , Claudia Peñaloza Salazar[2]

[1]Hebrew SeniorLife
[2]Cognition and Brain Plasticity Group

While using instruments that are congruent with the cultural and linguistic background of patients is expected in neuropsychological evaluations, resources to support these efforts are scant. The issue is more pronounced in age-related neurodegenerative diseases, as their prevalence is predicted to triple in the next three decades. Furthermore, older adults are often less acculturated compared to younger peers. This symposium aims to discuss factors relevant to culturally-competent translation and adaptation of tests as well as cognitive assessment of diverse populations. The challenges of this work will be illustrated with examples of patients with neurodegenerative diseases and focal brain lesions. Our symposium leverages global perspectives and aligns with recent emphasis on equity in clinical neuropsychology.
The first abstract sets the stage by providing a framework to guide the decision to adapt existing instruments or develop new ones. In this analysis of literature, Dr. Hallowell delineates the pros and cons associated with each alternative and the overarching social, cultural, and professional considerations that must inform this choice. The next abstract summarizes the socio-cultural and linguistic aspects relevant to cognitive assessments of Arabic-speaking patients. Dr. Taiebine will conclude his presentation by describing limitations associated with existing instruments and proving recommendations for clinicians working with Arabic-speakers. The last two abstracts illustrate the potential implications of linguistic and cultural diversity in Clinical Neuropsychology practice and research. Drs. Gavarró and Salmos will present results of the validation study for the Catalan version of the

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Comprehensive Aphasia Test (CAT). The results document the validity of the Catalan version of the CAT and factors such as patient education and age emerged as important predictors of performance. Finally, Dr. Calabria presents results from his investigation on cross-language interference in bilingual Catalan-Spanish patients with Parkinson's Disease, Mild Cognitive Impairment, and Alzheimer's Disease.
Overall, this symposium will provide a space to discuss factors relevant to test adaptation and cognitive assessment of linguistically and culturally diverse groups. Studies will illustrate the challenges of working with diverse groups. General recommendations on these topics will be provided.

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01 Translate an existing test in another language or develop an original test? Factors to consider

Brooke Hallowell[1]

[1]Springfield College (USA)

Objective: We will review a framework for considering the positive and negative aspects of: 1) translating and adapting an existing neuropsychological test for use in another language, or 2) developing a new test in a language in which no similar test yet exists.
Participants and Methods: This work is informed by a literature review and surveys of test development practices and the extant array of neuropsychological assessment tools across languages.
Results: Factors related to the decision to translate a test or develop an assessment tool anew are summarized.
Conclusions: Translating an existing test may at first seem easier and more efficient than developing a new assessment tool. However, there are substantial challenges to consider. Considering that most of our assessment tools have a significant language load (in terms of instructions, tasks, and or stimuli), it is especially important to consider the verbal content of our tools. There is never a direct correspondence between words and syntactic structure in one language with those of another language. Psycholinguistic controls implemented in the development of a test in a given language do not necessarily apply in a translated version. Consistently implementing controls for myriad cognitive and linguistic factors across all target languages is challenging; it requires special expertise in language and cognitive processing as well as in the neuropsychological conditions under study, plus native speaker status in the original and target language among the experts involved.

In addition, individuals' culturally related attitudes and beliefs associated with assessment tasks and means of indexing responses – and the mere act of testing itself – may influence performance. Norms developed in one language and based on a particular cultural group are not applicable to individual performance on a test in a different language and applied to members of a different cultural group. No matter how directly translated, a test's reliability and validity must be substantiated in any new target language. Development of a completely new test in a target language is often preferable. We will review factors to help guide the decision to translate a test or develop an assessment tool anew. Finally, we will recognize concerns related to English-language bias in neuropsychological assessment tools and how those might bias our decision making processes.

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02 Cultural and linguistic aspects in neuropsychological assessment of neurodegenerative diseases in Arabic

Mohamed Taiebine[1,2]

[1]Alzheimer's Center in Rabat
[2]University Mohammed V in Rabat, Morocco

Objective: The current clinical practice is characterized by an increased cultural difference in neuropsychological assessments. Given this variation, cross-cultural neuropsychology has evolved recently from a disease-centered approach to a person-centered approach, when a person is viewed as a cognitive, bio-psychosocial and socio-cultural entity that lives in a particular and dynamic environment.
Participants and Methods: I will cover the socio-cultural aspects as well as the linguistic characterization of Arabic in the neuropsychological investigation of neurodegenerative diseases in Arabic in the Moroccan context. I will present typical patterns of Alzheimer's disease and primary progressive aphasia in comparison with findings in European languages.
Results: I will present an overview of the socio-cultural aspects that should be integrated into neuro-cognitive testing in neurodegenerative diseases. This approach stems particularly from the Moroccan socio-linguistic profile. The limits of various tests will be discussed for patients with these disorders.

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Conclusions: A set of clinical recommendations will be formulated for clinicians dealing with cross-cultural assessment of neurodegenerative diseases in Arabic-speakers from Moroccan background.

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03 The adaptation and standardization of the Catalan version of the Comprehensive Aphasia Test

Io Salmons[1,2] , Anna Gavarró[1]

[1]Universitat Autònoma de Barcelona
[2]Universitat Oberta de Catalunya

Objective: The goal of the present study is to present the adaptation and results of the standardization of the Catalan version of the Comprehensive Aphasia Test (CAT; Swinburn et al. 2004; Salmons et al. 2021). The CAT is a comprehensive test to diagnose aphasia that evaluates cognitive and linguistic skills, and also includes a questionnaire to explore the patient's subjective perception on the impact of the aphasia (AIQ-21; Swinburn et al. 2018, adapted to Catalan by Rofes et al. 2020). The study has been developed within the framework of the international project The Collaboration of Aphasia Trialists (The Tavistock Trust for Aphasia), which aims at adapting the tool to more than 20 languages (Fyndanis et al. 2017), including so called minority languages like Catalan.
Participants and Methods: The test consists in 27 subtests that evaluate cognition (vision, attention, memory, executive functioning, motor and arithmetic skills) and language abilities (production, comprehension, naming, repetition, writing and reading). During the development of the Catalan version, psychometric properties such as frequency or imageability (Rofes et al. 2018) and linguistic variables like syntactic structure, morphological complexity, phonological features, among others, were controlled for.
Here we present the results from 84 healthy participants (age range: 18-90 years, 50 females and 34 males with different educational backgrounds), and 13 individuals with aphasia resulting from a left-hemisphere brain lesion (age range: 44-92; 8 women and 5 men; all right-handed; and with different types of aphasia, etiologies and educational backgrounds). All of them were bilingual speakers of Catalan and Spanish.
Results: The performance of healthy participants was at ceiling on all tasks although great variability among subjects was observed in specific subtests like the word fluency and digit span tasks. For example, the mean digit span of healthy participants was of 5.99/7, but the individual responses varied from 3/7 to 7/7. The variability is associated with variables like age and educational level, as has already been pointed out in previous studies (Peña-Casanova et al. 2009; 2012). On the other hand, subjects with aphasia performed worse than control subjects on all tasks, but specially on linguistic subtests; their performance on the sentence comprehension task was significantly different from the controls' (13.5/18 and 17.6/18 correct responses, respectively). Their performance on nonverbal cognitive tasks was much higher though it varied across subjects, which may indicate more general cognitive problems at an individual level.
Conclusions: The results indicate that the test is suited to evaluate Catalan speakers, but also that variables like age and educational background need to be taken into account when assessing the language and cognitive abilities of aphasic subjects. There is currently a lack of neuropsychological measures, especially in minority languages like in Catalan, to assess cognition and language disorders in aphasia. The test that we present can be useful in this regard with views to design more efficient interventions.

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04 Cross-language interference and facilitation in neurodegenerative diseases

Marco Calabria[1]

[1]Universitat Oberta de Catalunya (UOC)

Objective: Cross-language interference and facilitation are two effects associated with lexical selection in bilingual speech production. Neural models of bilingual language control suggest that cross-language interference is mainly associated with the activity of the fronto-striatal circuits with a limited involvement of the cortical areas. However, deficits in verbal interference tasks in monolinguals have been reported in patients with neurodegenerative diseases having cortical atrophy, such as Mild Cognitive Impairment (MCI) and Alzheimer's disease (AD).
The objective of the present study is to investigate cross-language interference in bilinguals by comparing patients with damage in fronto-striatal circuits (Parkinson's disease) and patients with cortical damage, such as MCI and AD.
Participants and Methods: Four groups of early and highly proficient Catalan-Spanish bilinguals took part in this study: 18 healthy

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older adults, 20 patients with PD, 20 patients with MCI and 19 with mild AD.
Participants performed a cross-language Stroop task in which they were asked to name the ink color of the words that were presented to them on the screen. Crucially, the naming language was in their dominant language whereas words were displayed in their non-dominant language. A bilingualism questionnaire was used to classify the language dominance of each participant.
There were three condition: 1) the word and the color name was different (the word 'yellow' printed in blue, Stroop condition); 2) the word and the color name was the same (the word 'yellow' printed in yellow, Identity condition); 3) the word was not a color name (the word 'sad' printed in blue, control condition).
The cross-language Stroop effect was calculated as the difference in naming latencies between the Stroop and control condition. The cross-language identity effect was calculated as the difference in naming latencies between the identity and control condition.
Results: The cross-language identity effect, which measures lexical facilitation, was larger in patients with PD (11.2%) as compared to controls (3.1; p= .05) and patients with MCI (2.5, p< .05), but of the same magnitude in MCI, AD and healthy controls (ps> .05). The Stroop effect, which measures lexical interference, was of the same magnitude in PD (6.6%) and controls (4.9%, ps= .98), but larger in the other two patient groups (MCI: 21.3%; AD: 20.1%; ps< .05).
Conclusions: The results suggest that the cross-language interference during lexical retrieval is more dependent on the integrity of cortical networks than fronto-striatal circuits. Lexical components of bilingual language production may play a role in resolving cross-language interference more than the executive ones.

Symposium 08: Brain Resilience and Maintenance in Advanced Age: Mechanisms and Study Frameworks

Sponsored by the Spanish Federation of Neuropsychological Societies FANPSE

Chair: David Bartrés

Presenters: David Bartrés, Natalie L. Marchant, Eider M. Arenaza-Urquijo, Lars Nyberg, David Bartrés-Faz

8:30-10:00h
Friday, July 8, 2022

SYMPOSIUM SUMMARY:

'Brain resilience and maintenance in advanced age: mechanisms and study frameworks'

From different frameworks, we will focus on factors and brain mechanisms that contribute preserved function in aging. Dr. Natalie Marchant will present evidence of how psychological aspects associate with cognition and brain health markers. Within the framework of resilience and resistance to Alzheimer's Disease (AD), Dr Arenaza-Urquijo will discuss the importance of a sex/gender and lifespan perspective to account for the impact of lifestyles and stress managing. Dr. Lars Nyberg will argue how the concept of brain maintenance can explain neural and non-neural factors that regarding interindividual differences in memory and cognition. Finally, how the use of non-invasive brain stimulation represents a unique approach to investigate and enhance brain mechanisms underlying brain resilience and brain maintenance will be discussed by Dr. David Bartrés-Faz.

01 Can the way we think affect our cognitive and brain health?

Natalie L. Marchant
[1]University College London, UK

Cognitive Debt describes how a style of repetitive negative thinking, may be a mechanism accounting for psychological factors (e.g. depression, anxiety) associated with increased risk for dementia. I will provide evidences of relationships between repetitive negative thinking and markers of cognitive and brain health from multiple cohorts; and will show preliminary evidence that a purported affirmative style of thinking and self-reflection, is positively associated with cognition and brain glucose metabolism.

02 Resilience and resistance to Alzheimer's disease: mental health and lifestyle in people at increased risk for cognitive decline

Eider M. Arenaza-Urquijo[1]
[1]BarcelonaBeta Brain Research Center (BBRC), Barcelona, Spain

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I will present data linking lifestyle and mental health with Alzheimer's disease pathologies, neuroinflammation and brain integrity. Midlife stress may enhance tau pathology and brain atrophy. During midlife, physical inactivity relates to higher amyloid, while increasing exercise was associated with preserved hippocampal volumes and microglia activation. Accumulation of stress and anxiety/depression may enhance neuroinflammation in women as well as brain atrophy. Once amyloid is present, women may be more prone to show increases in anxiety and depression in the face of stressors.

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03 Brain maintenance in aging – current status and future prospects,

Lars Nyberg[1]
[1]Umeå University, Sweden

Memory and cognition show average decline in aging, but at the individual level some elderly have well maintained function. Theories of 'reserve' focus on compensation for age-related brain changes. I will argue that the most convincing explanation is that of brain maintenance. Contrary to current dogma, some older adults do indeed show well-preserved brain structure and function, which in turn predicts well-preserved cognition. I will review support for the concept of brain maintenance, consider possible neural and non-neural mechanisms, and discuss the prospect of increasing the rate of population brain maintenance.

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04 Non-invasive brain stimulation to characterize and enhance brain resilience

David Bartrés-Faz[1]
[1]University of Barcelona

The use non-invasive brain stimulation (NIBS), such as transcranial magnetic or transcranial electrical stimulation stimulation, allow conducting experimentally controlled investigations in humans. Particularly when combined functional neuroimaging, NIBS can contribute uniquely to the characterization of brain resilience mechanisms, as well as be used to enhance associated cognitive function, including preliminary evidence of possible neuroprotective effects over AD pathology aggregation.

Paper Session 17: Short term and long term Outcomes in TBI outcomes

8:30-10:00h
Friday, July 8, 2022

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01 Neurocognitive Outcomes Following Mild Traumatic Brain Injury in Military Special Operations Forces

Lars Hungerford[1,2,3] , Mark Ettenhofer[1,2,3] , Jenna Trotta[1,2,3]

[1]Traumatic Brain Injury Center of Excellence
[2]Naval Medical Center San Diego
[3]General Dynamics Information Technology

Objective: Special Operations Forces (SOF) have unique operational demands with a higher rate of mild traumatic brain injuries (mTBI) in comparison with non-SOF units. The objective of this study was to further characterize neurocognitive outcomes in SOF members following mTBI using symptom reporting, neuropsychological tests and novel, multimodal assessments.
Participants and Methods: Participants were 108 SOF with a history of mTBI seen for evaluation and treatment at a large military treatment facility between 2018 and 2020. TBI history was recorded utilizing the Ohio State University-TBI-ID (OSU-TBI-ID) method, with supplementary questions regarding blast exposure and military service. The following self-report measures were collected: Neurobehavioral Symptom Inventory (NSI), Headache Impact Test-6 (HIT-6), Personal Health Questionaire-8 (PHQ-8), PTSD Check List for DSM5 (PCL-5), Pittsburgh Sleep Quality Index (PSQI), and Alcohol Use Disorder Identification Test (AUDIT-C). All SOF were administered the Bethesda Eye & Attention Measure (BEAM) and a brief neuropsychological battery as follows: Trail Making Test, Symbol Digit Modalities Test (SDMT), Neuropsychological Assessment Battery (NAB) Screening Subtests (Story Learning, Digits Backward, Numbers &Letters Parts A and B). Descriptive statistics were calculated, and derived scores were compared with published normative data.
Results: SOF were exclusively male, in their late 30s (M=36.43, SD=8.12), with some college (M=14.97, SD=2.03), nearly 15 years of active duty service (M=14.81, SD=7.7 3), and roughly 3 combat deployments (M=2.74, SD=2.15). SOF reported approximately 3 lifetime TBIs (M=3.16, SD=1.18) and more

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than 100 blast exposures (M = 135.00, SD = 106.44). The NSI (M=31.81, SD=13.05), PHQ-8 (M=8.45, SD=4.85), and PCL-5 (M=21.50, SD=14.12), were all below recommended cutoffs while the HIT-6 (M=53.52, SD=9.49) was minimally elevated and the PSQI (M=11.35, SD=3.93) was extremely elevated. Performance across traditional neuropsychological measures was entirely within normal limits for measures of attention (SDMT T=47.32, SD=11.94), immediate contextual auditory memory (Immediate Recall T-Score=44.92, SD=10.32) delayed contextual auditory memory (Delayed Recall T-Score=43.19, SD=10.32), processing speed (Trails A T-Score=51.98, SD=12.41), executive functioning (Trails B T-Score=49.81, SD=8.97), and a derived Global Cognition Score (T=48.17, SD=6.72). Furthermore, SOF performance on multi-modal BEAM metrics, which have been shown to be more sensitive to mTBI effects compared with traditional neuropsychological measures, was as follows: BEAM Manual Composite (T=45.50, SD=9.68), BEAM Saccadic Composite (T=41.54, SD=8.17), BEAM Total Score (T=43.12, SD=7.93). **Conclusions**: In previous work, Special Operations Forces were shown to be a distinct group from conventional military forces in terms of number of deployments, blast exposures, and performance on neurocognitive measures. The present study further characterized demographic and injury-related characteristics and their impact on objective measures of neurocognitive functioning within SOF. While overall performance on traditional neuropsychological measures and BEAM metrics was grossly within normal limits, there is a distinct possibility of unappreciated decline disguised by above-average baseline functioning. Further exploration is required to better identify and treat members of SOF who report declines in cognitive function following a history of mTBI despite grossly normal performance across objective measures of neurocognitive functioning.

02 Personal Factors and Long-term Outcome After Acquired Brain Injury: the Role of Resilience and Mood

Ieke Winkens[1,2] , Caroline Van Heugten[1,2,3] , Carina Resch[1] , Anne Visser-Meily[4,5]

[1]Department of Neuropsychology and Psychopharmacology, Faculty of Psychology and Neuroscience, Maastricht University, Maastricht, the Netherlands
[2]Limburg Brain Injury Centre, Maastricht University, Maastricht, the Netherlands
[3]Department of Psychiatry and Neuropsychology, MHeNS School for Mental Health and Neuroscience, Maastricht University, Maastricht, the Netherlands
[4]Center of Excellence for Rehabilitation Medicine, UMC Utrecht Brain Center, University Medical Center Utrecht, and De Hoogstraat Rehabilitation, Utrecht, the Netherlands
[5]Department of Rehabilitation, Physical Therapy Science & Sports, UMC Utrecht Brain Center, University Medical Center Utrecht, Utrecht, the Netherlands

Objective: The aim of this study was to assess associations between personal and environmental factors and health-related quality of life and participation more than two years after discharge from inpatient acquired brain injury rehabilitation.
Participants and Methods: Thirty-seven patients with acquired brain injury from five rehabilitation centers in the Netherlands participated in this study. Within approximately two weeks of enrolment in inpatient rehabilitation, demographic and injury-related characteristics were assessed, such as age, gender, level of education, type of injury, time since injury, severity of injury (measured with the Barthel Index of Activities of Daily Living), and length of inpatient rehabilitation. Additional assessments were done approximately two years after discharge. Outcome variables included the Stroke Specific Quality of Life Scale-12 (physical subscale and psychosocial subscale) and the Utrecht Scale for Evaluation of Rehabilitation-Participation (restriction subscale and satisfaction subscale). In addition, personal and environmental factors were assessed with the Hospital Anxiety and Depression Scale (depression subscale), the Utrechtse Coping Lijst (passive subscale), the University of Washington Self-Efficacy Scale, the Positivity towards the Future Visual Analogue Scale, the Connor-Davidson Resilience scale-10, the Family Assessment Device 12 and the POWER Social Network Scale. Associations between the personal and environmental factors and health-related quality of life and participation were examined using Spearman correlation coefficients (with Bonferroni correction for multiple comparisons). Subsequently, linear regression analyses were conducted to examine which factors were significantly associated with health-related quality of life and participation. For each analysis, only the variables that were significantly correlated with the outcome measures in the bivariate analyses were used. In

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addition, we controlled for demographic and injury-related factors.
Results: Bivariate correlation analyses revealed that mood, passive coping, positivity towards the future, resilience, family functioning and social support were significantly associated with health-related quality of life and/or participation (Spearman's r ranged between 0.458 and -0.815). After controlling for demographic and injury-related factors, resilience was the only factor that was significantly associated with participation restrictions and participation satisfaction (β = 0.549 and β = 0.752); higher resilience was associated with better participation. Mood was the only factor that was significantly associated with psychosocial and physical health-related quality of life (β = -0.842 and β = -0.532); more depressive symptoms were associated with lower quality of life.
Conclusions: This study shows that personal factors, in particular resilience and mood, play a role in predicting health-related quality of life and participation long after inpatient ABI rehabilitation. This emphasizes the need for regular monitoring of these factors, and when necessary investing in building resilience in the years after acquired brain injury.

03 Cognitive impairments and subjective cognitive complaints in survivors and caregivers after a cardiac arrest

Caroline van Heugten[1] , Veronique Moulaert[2] , Catherine Steinbusch[3] , Pauline van Gils[1] , Jeanine Verbunt[3,4]

[1]Maastricht University, Limburg Brain Injury Center, School for Mental Health and Neuroscience, Department of Psychiatry and Neuropsychology
[2]University Medical Center Groningen
[3]Centre of Expertise in Rehabilitation and Audiology, Adelante
[4]Maastricht University, School for Public Health and Primary Care, Department of Rehabilitation Medicine

Objective: Cardiac arrest can lead to hypoxic brain injury, which can affect cognitive functioning. The objective of this study was to investigate the course of objective cognitive impairments and subjective cognitive functioning from the perspective of patient and caregiver during the first year after cardiac arrest.
Participants and Methods: This was a multi-center prospective longitudinal cohort study with one-year follow-up (measurements at two weeks, three months and one year). Cognitive functioning was measured with a neuropsychological test battery. The battery included the following tests: Cognitive-Log (global cognitive performance), Trail Making Test A (psy-chomotor functioning) and B (executive functioning), Verbal Fluency Test (semantic memory and word fluency), Paragraph Recall (PR) Test Direct and Delayed (short-term and delayed verbal memory) and The Adult Memory and Information Processing Battery (AMIPB) Task A (information processing speed). Subjective cognitive functioning from the perspective of patient and caregiver (about the patient-proxy) was assessed with the Cognitive Failures Questionnaire.
Results: Data of 110 cardiac arrest survivors and 76 caregivers were analyzed. Two weeks post cardiac arrest 16% to 29% of survivor were cognitively impaired varying on the different tests, at three months between 9% and 23% and at one year 10%–22% remained impaired with executive functioning being affected most. Significant reduction of cognitive impairments was seen for all tests, with most recovery during the first three months after cardiac arrest. Subjective cognitive complaints were present at two weeks after cardiac arrest in 11%, 12% at three months and 14% at one year. There were no significant associations between cognitive impairments and cognitive complaints at any time point. Subjective cognitive complaints as measured by proxy (caregiver perspective) were present in 11%, 5% and 11% respectively.
Conclusions: Cognitive impairments are common in cardiac arrest survivors with executive functioning being mostly affected. Most recovery is seen in the first three months after cardiac arrest. After one year, a substantial number of patients remain impaired, especially in executive functioning. Subjective cognitive complaints are low, both in patients and caregivers. This may be explained by a response shift (gratitude after survival) rather than a lack of self-awareness in the patients. Because of absence of associations between impairments and complaints, cognitive testing using a sensitive test battery is important and should be part of routine follow-up after a cardiac arrest.

04 Prognostic study of functionality and cost-effectiveness after traumatic brain injury using machine learning

Joan Ferri[1] , Julio Silva-Rodríguez[2] , Adrián Colomer[3] , Valery Naranjo[3] , Myrtha O´Valle[1] , Desiree Amorós[1] , Silvia Cerezo[1] , Carmen García-Blazquez[1] , Pablo Villarino[1] , Mª Dolores Navarro[1] , Enrique Noé[1] , Roberto

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[3]Institute of Research and Innovation in Bioengineering, Universitat Politècnica de València, Valencia, Spain

Objective: In neurorehabilitation, prognostic estimation after traumatic brain injury (TBI) is a key element to guide clinical decision making. The aim of this project is to improve the prediction of the degree of functionality of subjects who have suffered a TBI using machine learning techniques applied to both static and dynamic variables determined with specific clinical scales of a representative set of subjects.
Participants and Methods: 516 patients with TBI who were included in a neurorehabilitation program and followed up for a minimum period of 6 months. Of these, 353 had a follow-up assessment one year after admission. To develop the predictor model, four levels or sets of variables have been defined to analyze their predictive capacity on the target variable: 1) sociodemographic variables; 2) variables related to the severity of the injury; 3) functional status at admission; and 4) evolution of the functional status defined by the variation of the FIM score between the initial assessment and the follow-up after 6 months of inclusion in a neurorehabilitation program. The target variable was the total FIM score and its stages.
Results: Four models were developed based on the predictor variables. The first one that included sociodemographic variables obtained a correlation of 0.50; the model developed from the severity of the injury obtained a correlation of 0.75 and the one that considered the functional situation at admission obtained a correlation of 0.79. Finally, the model with the greatest predictive capacity was the one that included the evolution of functional status after 6 months of neurorehabilitation treatment, showing a correlation of 0.92.
Conclusion: These results show that the greatest functional predictor value is determined by its response to clinical intervention in a neurorehabilitation program, beyond the sociodemographic variables (age, sex, etc.), the severity of the lesion and the functional situation at the time of admission.
Funding: This research was funded by Fundación Mapfre.

Symposium 09: Neuropsychological Evaluation and Tasks Proposals to meet needs of the Legal Context

Sponsored by Sociedad Española de Neuropsicología Jurídica y Forense, SENJYF

Chair: Andrea Horta-Barba

Presenters: Andrea Horta-Barba, Julia C Daugherty, Raúl López-Antón, Rocio Del Pino

8:30-10:00h
Friday, July 8, 2022

SYMPOSIUM SUMMARY:

Neuropsychological Evaluation and Tasks Proposals to meet needs of the Legal Context

Andrea Horta-Barba[1,2,3]

[1]Sociedad Española de Neuropsicologia Jurídica y Forense (SENJYF)
[2]Movement Disorders Unit, Neurology Department, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain
[3]Department of Medicine. Universitat Autònoma de Barcelona (UAB), Barcelona, Spain
[4]Institut d´Investigacions Biomèdiques- Sant Pau (IIB-Sant Pau), Barcelona, Spain
[5]Centro de Investigación en Red-Enfermedades Neurodegenerativas (CIBERNED), Spain

Forensic Neuropsychology is a relative new discipline which is rapidly evolving. Is a subspecialty of clinical neuropsychology which encompasses the application of the neuropsychological science and psychological assessments within a legal context.
The United Nations Convention on the rights of persons with disabilities, held in New York in 2006, has generated very relevant changes in the legislative need to adapt access to justice for persons affected by a disability to guarantee the exercise of their rights.
The Spanish legal system has incorporated these changes, emphasizing the principles of equality and accessibility to establish protection and support measures based on the specific needs of each person. In fact, "Law 8/2021, of June 2, which reforms civil and procedural legislation to support people with disabilities in the exercise of their legal capacity", represents a paradigm shift in the consideration of these people within the judicial system, both in its civil and criminal aspects. One of the main novelties is that it ends with the consideration of legal incapacitation

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and that "representative" or "assistance" guardianships will be sought depending on the specific needs of the person.
With regard to people with a cognitive disability, caused by various etiologies, this new legal consideration establishes as an essential requirement that the Prosecutor who acts in this type of procedure request two types of reports: health and social. Neuropsychology professionals, as one of the figures that represent the health area, will be able to receive judicial requests about the description of mental disability and a significant increase in these requests for neuropsychological reports can be expected. The areas that should be covered by, at least, the expert reports (collected in the Doctrine of the State Attorney General's Office, instruction 3/2010, of November 29), are: a) mental illness or disability indicating its prognosis; b) the affectation in the intellective and/or volitional capacities to govern the personal and patrimonial sphere; c) effects of the disease delimiting the functional skills: skills for independent living, legal-economic-administrative skills, skills on health, for the transport and handling of weapons in relation to the procedure itself, and contractual capacity.
Legislative changes conditions require adapting our work procedures to meet the requirements. People with mental disabilities constitute a huge group and we need specific evaluation procedures that allow knowing the mentioned aspects for the best advice and access to the judicial system.
Forensic neuropsychology has a primary responsibility to provide information based on scientifically-validated neuropsychological principles and clinical methodology that is pertinent to the forensic question. To date, there are growing studies assessing if the instruments used, are suitable to be used in the legal context. Therefore, the aim of this symposium is to present tools that meet acceptable scientific standards in the Courtroom and discuss about the expecting emergent future of forensic neuropsychology.

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01 Neuropsychological Evaluation and Tasks Proposals to meet needs of the Legal Context

Julia C Daugherty[1]

[1]Universidad de Valladolid

Recent findings demonstrate that female survivors of intimate partner violence (IPV) experience cognitive and brain alterations related to traumatic brain injury (TBI), strangulation, and PTSD. Neuropsychological impairment has important forensic implications in terms of the victim's testimony and the evaluation of acquired damages (Marín et al., 2016). Nonetheless, the existing effort tests commonly used with this population may be leading to false-positives, thus unfairly accusing female victims of malingering or exaggerating their symptoms (Marin-Torices, et al., 2018). Furthermore, the majority of effort tests are not available in the public domain and are not computerized, which places further barriers to access on women who do not have a neuropsychologist in their area.
Objective: The objective of this talk is two-fold: 1) to present published data on the psychometric properties of the free and computerized effort test the Coin in Hand-Extended Version (CIH-EV) in Spain, Portugal, Colombia and the USA (Daugherty et al., 2019), and 2) to suggest potential applications of the CIH-EV within the Believe Battery (www.projectbelieve.info), a free and comprehensive neuropsychological battery for female
survivors of IPV.
Participants and Methods: Undergraduate students were recruited at the University of Granada (Spain; n = 116), Universidade de Lisboa (Portugal; n = 75), Universidad del Norte (Colombia; n=42), and Harvard University (USA; n=42), and were randomly assigned to the analog or control group. Analog participants were asked to malinger cognitive impairment caused by a TBI. All participants were administered the CIH-EV, Test of Memory Malingering (TOMM), and other performance validity tests available in each country.
Results: Data collected from the Spanish pool was used to establish psychometric properties for the test. Data collected from all four countries was used to make cross-cultural comparisons in performance. For the first objective of assessing psychometric properties, findings revealed that the analog group's performance deteriorated from Block 1 to 3, as the perceived difficulty of the task increased. This was not the case for the control group, who did not demonstrate statistically different scores between each Block. When scores were collapsed across the three difficulty levels, the control group outperformed the analog group in terms of hits and response time. We found a high area under the curve for the total number of hits (.96), and the selected cutoff score (≥27) demonstrated adequate sensitivity of 95% and specificity of 95%. Finally, the CIH-EV demonstrated optimal convergent validity with

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other commonly used performance validity tests (i.e. the Victoria Symptom Validity Test and the TOMM). In terms of the cross-cultural comparisons, the same cutoff score was found for each country.
Conclusions: The CIH-EV demonstrated optimal psychometric properties in terms of specificity, sensitivity and convergent validity with other commonly used performance validity tests. Furthermore, there was a high cultural equivalence across the different countries included in this study. While the CIH-EV would need to undergo additional validations (i.e. with forensic populations and TBI patients), it may be a promising tool for supporting cognitive testing with female survivors of IPV in forensic settings internationally.

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02 The IDEAL Scale to Staging "Care Needs" in People with Dementia: The Spanish Validation Experience

Raúl López-Antón[1,2]

[1]Psychology and Sociology Department. University of Zaragoza (Zaragoza, Spain. [2]Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Madrid, España

Objective: In a context of increasing preoccupation with the problem of dementia, a multi-disciplinary group of leading European specialists, named the International Dementia Alliance (IDEAL) network, proposed The IDEAL Schedule developed for staging "care needs" in patients with dementia that aimed to build consensus among all concerned with controversial issues related to the care for people with dementia. This presentation aims to expose how the Spanish version of the IDEAL Schedule was validated and what conclusions we reached.
Participants and Methods: We carried out a multicenter study in 8 dementia care facilities across Spain. Patients referred with a reliable ICD-10 diagnosis of dementia (n = 151) were assessed with the IDEAL Schedule by pairs of raters. Inter-rater reliability (intra-class correlation [ICC] coefficients), internal consistency (Cronbach's alpha), and factor analysis were calculated. Convergent validity for individual items was tested against validated Spanish versions of some international selected instruments.
Results: A previous pilot study supported the feasibility, face and content validity of the schedule. The psychometric coefficients were good/clinically acceptable: inter-rater reliability (mean ICC=0.861; 85% of the ICCs>0.8), internal consistency (global alpha coefficient=0.74 in 5 nuclear items), and concurrent validity (global score against the Clinical Dementia Rating schedule, r=0.63; coefficients for individual items ranging from 0.40 to 0.84, all statistically significant, $p<0.05$). Internal consistency was low for the "nonprofessional care" and "social support" dimensions. Factor analysis supported a unidimensional solution, suggesting a latent "care needs" construct.
Conclusions: The Spanish version of the IDEAL Schedule confirmed the main psychometric properties of the original version and documented for the first time the convergent validity of individual items. Factor analysis identified a latent construct consistent with the concept "care needs" although two dimensions need further psychometric research.

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03 Premorbid Intelligence Calibrated Norms: The Word Accentuation Test and Pseudo-Words Reading Subtest

Rocio Del Pino[1]

[1]Neurodegenerative Diseases group. Biocruces Bizkaia Health Research Institute, Barakaldo (Bizkaia, Spain)

Objective: to develop demographically calibrated norms for two premorbid intelligence measures, the Word Accentuation Test (WAT, Spanish adaptation of the NART) and the PseudoWords (PW) Reading subtest from the Battery for Reading Processes Assessment-Revised (PROLEC-R), in a representative sample of Spanish population in terms of age, education, and sex and to apply the premorbid intelligence to Forensic Neuropsychology.
Participants and Methods: A sample of 700 healthy participants from 18 to 86 years old were evaluated with the WAT and the PW Reading subtest to estimate premorbid IQ. The effect of age, years of education, and sex on WAT total score, PW total score, and time to complete the PW task were analyzed. Percentiles and scalar scores were calculated for each raw score according to nine age ranges and individual education levels.
Results: A significant effect of age and education on premorbid performance was shown, explaining from 1.9 to 33.2%. Older participants with fewer years of education obtained worse premorbid IQ estimates which started in the 56–65 age range for WAT and PW

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time, whereas it started in the 71–75 age range for PW total score.
Conclusions: Demographic-calibrated norms for premorbid IQ measures for the Spanish-speaking population are reported. Our study pointed out that combining demographic variables with reading ability tests provides higher reliable estimates of premorbid IQ. Although both measures are proper measures to estimate premorbid IQ, the PW Reading subtest seemed to be more resistant to decline in the elderly population than the WAT.

Symposium 10: Detection, filiation, assessment and treatment of visuoperceptive and visuospatial disorders in brain damage

Sponsored by the Spanish Consorcio de Neuropsicología Clínica

Chair: Manuel Cid

10:00-11:30h
Friday, July 8, 2022

Debate: Detection, Filiation, Assessment And Treatment Of Visoperceptive And Visospatial Disorders In Brain Damage. Effectiveness Approaches.

Chair: Silvia Gamazo Navarro

Presenters: Catarina Cunha, Jessica Giuffrida, Helena Melero Carrasco

- Catarina Cunha: Cognitive detection and semiology in perceptual and visuospatial alterations
- Jessica Giuffrida: Semiology and cognitive approach in perceptive and visuospatial alterations
- Helena Melero Carrasco: Advances in the cognitive approach to perceptual and visuospatial alterations

Abstract:

Perceptual and visuospatial alterations in brain damage are relatively frequent. It is estimated that 60% of people who suffer a stroke have some type of alteration in visual perception.

Among the variety of perceptual alterations that can occur, there are different types. Associative, apperceptive agnosias, chromatic agnosias, prosopoagnosia are some types of visual agnosias. Likewise, tactile agnosias such as asteroagnosia, somatic and auditory agnosias are other types of perceptual alterations that may be present.

Spatial function, on the other hand, is responsible for how we orient ourselves and direct our movements in space, and how we locate the environment. It requires our senses, so it is necessary to clearly know the semiology of its alteration.

Its adequate detection and affiliation from clinical semiology is fundamental for the clinic that evaluates brain damage alterations, especially when the perceptual process is a process segregated from the rest and therefore with specific pathways that make it particular.

We present in this symposium the clinical experience of four professionals who have focused their practice on the perceptual alterations. An updated clinical vision of current treatments, investigation and instruments for the care of perceptual and visospatial disorders of brain damage will be offered.

Paper Session 18: Novelty approaches to Neuropsychological assessment

10:00-11:30h
Friday, July 8, 2022

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01 Development of an Anterograde Topographic Orientation Abilities Assessment Task in a VR Environment.

Pablo Rodriguez Prieto[1] , Joaquín Alejandro Ibañez Alfonso[1]

[1]Universidad Loyola Andalucia

Objectives: Topographic orientation abilities are crucial for human survival because they allow us to form mental maps of the environment we live in and navigate through it. Until recently topographical disorientation (the partial or total loss of this ability) has been assessed with traditional “pencil and paper” tests, but with recent technological and scientific advancements, new and more ecologic methods have become viable for this purpose. One of these technologies is Virtual reality (VR), which allows us to assess orientation in three dimensions, but without the need for an

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actual dedicated open space. Here, our objective was to design and develop an anterograde topographic orientation abilities assessment task in a VR environment.
Participants and Methods: 40 young adults (11 men and 29 women; between the ages of 18 and 35) without any history of neurological impairment took part. We administered the neuropsychological tests of: Montreal cognitive assessment (MoCa), Rey's complex figure, Wechsler Memory Scale III (WMS-III): Scenes and Spatial Location, Benton's judgement of line orientation (TOLB), Five digit test, Zoo map test (BADS); together with our experimental VR task. These instruments were chosen to assess participants' executive functions, visuospatial perception, and visuospatial memory. The virtual environment used in the task was created using the free VR environment creator app Microsoft Maquette. This task consisted of 28 trials of varying difficulty. For some trials, the participants had to imagine the locations to answer questions. For other trials, the participants were able to freely move around the VR environment. For these latter trials, participants were required to locate a series of places and/or objects that they had previously memorized, always following the shortest path towards them. The environment changed depending on the stage of the test, with certain paths blocked or unblocked in different moments to force the participants to plan different routes.
Results: Participants who scores less than or equal to percentile 2 in the MoCa screening test were excluded from the analysis. Significant gender differences were observed in two neuropsychological tests – males outperformed females in the TOLB and WMS-III: Spatial Location). Reliability assessment of the VR task's items concluded that it had acceptable internal consistency (Cronbach's $\alpha = .74$). Furthermore, a medium-to-large positive correlation was found between the participants' performances on the VR task and many of the neuropsychological assessments; specifically, the MoCa test, TOLB, the memory segment of Rey's complex figure, both subtests inside WMS-III and the alternance component of the five digit test.
Conclusions: This study has managed to create a VR task with acceptable reliability as well as being coherent with the process it aims to assess. This is due to the strong correlation that it has with the abilities of perception, retention, and processing of visuospatial information. Our results indicate that this VR task may be a viable medium for the assessment of anterograde topographic orientation abilities, and perhaps VR as a whole could be used to develop all kinds of assessment tasks.

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02 The Multi-modal Evaluation of Sensory Sensitivity (MESSY): how to Assess a Commonly Missed Stroke Symptom

Hella Thielen[1] , Nora Tuts[1] , Lies Welkenhuyzen[1,2,3] , Irene Huenges Wajer[4,5] , Christophe Lafosse[6] , Robin Lemmens[7] , Alain Wibail[8] , Céline Gillebert[1,3]

[1]Department Brain & Cognition, Leuven Brain Institute, KU Leuven, Leuven, Belgium
[2]Department Psychology, Hospital East-Limbourgh, Genk, Belgium
[3]TRACE, Centre for Translational Psychological Research (TRACE), KU Leuven – Hospital East-Limbourgh, Genk, Belgium
[4]Department of Neurology and Neurosurgery, University Medical Center Utrecht, Utrecht, The Netherlands
[5]Experimental Psychology, Utrecht University, Utrecht, The Netherlands
[6]Paramedical and Scientific Director, RevArte Rehabilitation Hospital, Edegem, Belgium
[7]Neurology, University Hospitals Leuven, Leuven, Belgium
[8]Neurology, Hospital East-Limbourgh, Genk, Belgium

Objective: Stroke patients frequently experience sensory hypersensitivity. They may report feeling overwhelmed by background chatter, having an unpleasantly strong sense of taste, or feeling discomfort when surrounded by bright or multicolored visual stimuli. Since post-stroke sensory hypersensitivity can negatively impact quality of life and functional recovery, adequate assessment is of high importance. However, to date, these symptoms are rarely addressed by healthcare professionals due to a lack of appropriate diagnostical tools. Our aim was to develop a stroke-friendly sensory sensitivity questionnaire, assess its psychometric properties and examine whether the questionnaire was sensitive to post-stroke sensory hypersensitivity.
Participants and Methods: We developed the Multi-modal Evaluation of Sensory Sensitivity (MESSY), a questionnaire that assesses sensory hypersensitivity across multiple sensory modalities (including visual, auditory, tactile, olfactory, gustatory and vestibular sensitivity) and is adapted to the stroke population. 73 subacute stroke patients (age range: 28-90 years) and 422 neurotypical adults (age range: 18-91 years) completed the MESSY. The convergent validity of the MESSY was assessed

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in a sample of 201 neurotypical adults who completed both the MESSY, as well as the Adult/Adolescent Sensory Profile. In addition, 190 neurotypical adults completed the MESSY twice with an inter-test interval of one week to assess test-retest reliability. The internal consistency of the MESSY was assessed using Chronbach's alpha. Lastly, we conducted a Kruskall Wallis test to see if stroke patients with post-stroke hypersensitivity (identified during a semi-structured interview) displayed a significantly higher mean item score on the MESSY (per sensory modality) as compared to stroke patients without post-stroke hypersensitivity and neurologically healthy adults.
Results: In neurotypical adults, the MESSY had a very high internal consistency (α = .9), an adequate convergent validity (Rs = .7) and a high test-retest reliability (Rs = .8). A heightened sensitivity to visual, auditory and vestibular stimuli were reported by respectively 34%, 27% and 22% of the stroke patients during a semi-structured interview. The stroke patients who reported experiencing post-stroke sensory hypersensitivity during a semi-structured interview scored significantly higher on the MESSY as compared to stroke patients who did not report experiencing post-stroke sensory hypersensitivity as well as compared to neurotypical controls.
Conclusions: We conclude that sensory hypersensitivity is prevalent in stroke patients and that the MESSY can offer a valid and reliable assessment of sensory sensitivity. Assessment using adequate diagnostic tools can advance our understanding of the aetiology of post-stroke sensory hypersensitivity as well as its prevalence and treatment. These advances in scientific knowledge can lead to better patient care as well as a reduction in the disabilities related to atypical sensory sensitivity after acquired brain injury.

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03 Why a VR math cognition test? Implications for the assessment and a better understanding of Developmental Dyscalculia.

Elena Salillas[2] , Gema Climent[1]

[1]Giunti Nesplora Technology and Behavior
[2]Department of Psychology and Sociology, University of Zaragoza, Spain.

The numerical cognitive system implies the orchestration between domain-specific and domain-general functions such as working memory or inhibition (Arsalidou & Taylor, 2011; Menon, 2015). It is based on a complex interaction of neural systems with hubs in the parietal, frontal, and occipitotemporal cortex, or subcortical structures. A well-defined and comprehensive approach is needed not only for assessment but also for the description of differential cognitive profiles in healthy or damaged numerical systems (Castaldi et al., 2020)

We will present *Indoor-math,* a test that combines virtual reality (VR) and multivariate analysis based on artificial intelligence (AI) for the assessment of our numerical system. The use of VR is not capricious: numerical representations imply a fundamental visuospatial component that is optimally assessed using VR (Hubbard et al., 2005). We can simulate realistic numerical input in the 3D space. The use of AI allows an all-embracing consideration of the multi-componential nature of numerical reasoning.

Indoor Math is based on advances from the neuroscience of math development. It involves a cross-sectional assessment of 6 to 18 years-old participants for normalization. It entails two pivotal sets of items. (a) We measure domain-specific functions, from non-symbolic to symbolic numerical processing, and the match between them. We emphasize the measure of visuospatial representations as in their evolution across ages. The use of VR enables the monitorization of abnormal use of finger counting or abnormal strategies, when memory-based representations are expected, during calculation. Numerical reasoning will be also measured setting apart the use of linguistic material. (b) We include the assessment of domain-general abilities implying numerical input. Based on IA multivariate data analyses, we can describe the progression in the use of those general abilities across ages, and how they may support the development of a more autonomous numerical system.

Crucially, *Indoor Math* stresses the clustering of dimensions to precisely delimit different cognitive profiles, including those cases where the math system fails, in Developmental Dyscalculia (DD). The test not only provides a detailed DD assessment, it also allows the unknown, yet very needed delimitation of clear profiles in DD. The outcome of Indoor Math is a data-based qualitative description of the assessed system, providing information about strengths and difficulties, which importantly, will guide intervention.

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Importantly, *Indoor-math* is applied together with *Indoor*, a VR test for the assessment of fluid intelligence. This joint application allows dissociating numerical abilities from general intelligence. This is crucial because currently there is no way to strictly test them independently. The combination of the two tools further extends our exploration of the role of domain-general functions within math functioning.

In sum, *Indoor Math* involves a great advance in the description and understanding of the numerical system and its concrete paths of failure. Based on the understanding of spared abilities as a part of a complex system, it has the ultimate goal of guiding compensation and ways for neural reorganization, in research, clinical or pedagogical contexts.

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04 WISC-V structure by using Bayesian causal model discovery (BCCD) as an alternative for CFA

Marc Hendriks[1,2] , Marjolein van Dijk[2,3] , Izak Bragt[2] , Paul van der Heijden[1,3]

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[2]Academic Centre for Epileptology, Kempenhaeghe, Heeze, The Netherlands
[3]Reinier Van Arkel Mental Health Institute, 's-Hertogenbosch, The Netherlands

Objective: Since the publication of the Wechsler intelligence scales, efforts have been made to explore the structural validity by mainly applying factor analysis. However, conventional factor analysis has not been able to unify theories of intelligence like the Cattell Horn Carroll (CHC) taxonomy of intelligence, with empirical intelligence testing. Whereas the Wechsler Intelligence Scale for Children–Fifth Edition (WISC-V) is based on a hierarchical five-factor model of intelligence, a growing body of literature points towards a four-factor bifactor model of intelligence based on confirmatory factor analysis (CFA). The aim of the current study is to compare CFA to Bayesian constraint-based causal discovery (BCCD) and to interpret results in the light of the contemporary CHC model of intelligence.
Participants and Methods: In a total clinical sample of 455 children (50,11% male; mean age 11.76, SD=2.91) with epilepsy and other neurological disorders, the total IQ, index scores and subtests scores on the Dutch version of the WISC-V were analysed using raw scores for CFA and both raw and standardized scores for BCCD.
Results: BCCD results were inline with the CHC-model of intelligence. No conclusive evidence for either a four-factor or a five-factor model could be found, as the index Fluid Reasoning was not internally connected. Other strong connections between subtests of different intelligence domains were also found. CFA favours a four-factor bifactor model. When restristed to hierarchical models, CFA favours a five-factor model as applied in the WISC-V over a four-factor model.
Conclusion: BCCD sheds new light on the debate how intelligence structures need to be modelled. No conclusive answer was found as to whether to adhere a four-factor or a five-factor model of intelligence. These results from a large sample of clinical patients with neurological disorders fit the CHC-framework of intelligence more clearly. The structural causal discovery approach may be helpful in better interpreting the WISC-V.

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05 Validity of the Dynamic Clock Drawing Task for Assessing Learning Potential in Elderly Stroke Patients

Martine Wilbers[1] , Chantal Geusgens[2] , Caroline van Heugten[3]

[1]Department of Clinical and Medical Psychology, Zuyderland Medical Center, Sittard & Heerlen, the Netherlands.
[2]Department of Clinical and Medical Psychology, Zuyderland Medical Center, Sittard & Heerlen, the Netherlands.
[3]School for Mental Health and Neuroscience, department of Neuropsychology and Psychopharmacology and Limburg Brain Injury Center, Maastricht University, The Netherlands.

Objective*:* Dynamic tests are specifically designed to measure learning potential, and the dynamic version of the Wisconsin Card Sorting Test (dWCST) has shown adequate psychometric properties and sufficient construct validity in adults with acquired brain injury. However, it is expected that the dWCST has a low feasibility in elderly stroke patients. The main goal of this study was to design a dynamic version of the Clock Drawing Task (dCDT) which is both valid and feasible for assessing learning potential in elderly stroke patients.
Participants and Methods*:* Participants were stroke patients admitted to a geriatric rehabilitation unit. Construct validity of the dCDT was examined in comparison with the

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dWCST by a) examining correlations between different learning potential indices of the dCDT, and b) determining the ability of the dCDT to categorize patients into different groups based on their test performance. Convergent validity of the dCDT was examined by analyzing correlations between the learning potential indices of the dCDT and those of the dWCST. Feasibility of the dCDT and the dWCST was examined in terms of administration time and the percentage of participants who completed the task.
Results: 47 patients were included. The numerical learning potential indices of the dCDT were not significantly correlated. The group classification index of the dCDT classified 70.2% of the participants as high achiever, 10.6% as strong learner and 19.1% as poor learner. The numerical learning potential indices of the dWCST were significantly correlated. The group classification index of the dWCST classified 5.3% of the participants as high achiever, 42.1% as strong learner, 50% as poor learner and 2.6% as decliner. There were no significant correlations between the learning potential indices of the dCDT and the learning potential indices of the dWCST. All participants were able to complete the dCDT in a mean administration time of seven minutes. The dWCST was administered to 43 participants, of these 39 (90.7%) were able to complete the dWCST. The mean administration time of the dWCST was 36 minutes.
Conclusions*:* The results provide no support for the use of the dCDT in the elderly stroke population. The results do confirm that the dWCST shows adequate construct validity and adequate feasibility in the elderly stroke population, despite longer administration time. Further research is needed to examine the predictive validity of the dWCST.

Paper Session 19: From MCI to Dementia: What´s new

10:00-11:30h
Friday, July 8, 2022

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01 Detecting Pre-Clinical Signs of MCI or Dementia in Healthy Elderly Populations: A new Paradigm, the VALMT

Terry McGibbon[1] , Ashok Jansari[1]

[1]Goldsmiths, University of London

Objective: While memory deficits, particularly amnesia, are classically linked to medial temporal lobe damage, evidence over the last two decades has demonstrated that there are other groups who show different, but nonetheless significant patterns of forgetting. These can include older adults at risk of dementia and individuals who may suffer from Chronic Traumatic Encephalopathy (CTE) from repeated non-concussive head injuries through sport. While amnesia can be detected using standard clinical measures, many elderly individuals pass these tests despite subjective complaints of memory problems; however, meta-analyses have shown that about 20% of these individuals go on to develop dementia. Given the personal, financial and societal costs of dementia in an ageing population, and the benefits of early identification of those at risk of dementia, and separately, the increased reporting of early onset dementia in those who have played contact sports for many years, we evaluated, in these groups, the sensitivity of a new task, the Verbal Associative Learning & Memory Task (VALMT).
Participants and Methods: VALMT involves a phase of learning unrelated word pairs (e.g. TROOP-SHAWL) to a set criterion and then being tested with cued recall (e.g. TROOP-???) 55 minutes and 24 hours later. In Study 1, performance on the VALMT and Logical Memory subtest (LMS) of the Wechsler Memory Scale as well as subjective complaints of memory were compared in 30 Younger (19-31yrs) and 30 Older (60-69yrs). In Study 2, 35 people who self-reported playing Contact sports were compared to 68 Controls who did not.
Results: In Study 1, it was found that VALMT differentiated between the Younger and Older participants ($F(1, 58) = 13.72$, $p < .001$, $h_p^2 = 0.19$) ; further, by separating the latter group into those who learned to criterion more rapidly than those who didn't, it was found that Slow Older learners forgot much more rapidly compared to their Fast Older age-matched controls (($F(3.1, 88.9) = 21.52$, $p < .001$, $h_p^2 = 0.43$). Importantly however, there was no difference between these two Older groups on the LMS ($F(1,58)=1.41$, $p=.240$, $h_p^2=.02$). In Study 2, it was found that while there was no difference between the Contact and Control groups at 55 minutes, by 24 hours, the Contact group had forgotten significantly more ($t(101) = -2.86$, $p = .01$, $h_p^2= .60$).
Conclusions: Our findings suggest that the VALMT has potential for detecting rapid forgetting in otherwise healthy ageing populations and people at who are susceptible to CTE to identify those at risk of developing dementia at earlier time points than is currently

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possible. Such findings could have important implications in terms of providing early support for such individuals as well as for highlighting the negative impact of repeated head injuries to the sporting world.

02 Association Between CSF Biomarkers and the Test of Memory Strategies in Mild Cognitive Impairment Patients

Anna Carnes-Vendrell[1] , Gerard Piñol-Ripoll[1] , Brenda Chino-Vilca [2] , Lucia Torres-Simon[3] , Agnieszka Żelwetro [4,5] , Inmaculada Concepción Rodríguez-Rojo[6] , Raquel Yubero[7] , Nuria Paul[3] , Fernando Maestu[3,8]

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Objectives: The effect of deficits in executive functions in the memory performance is still unclear. The Test of Memory Strategies (TMS) is a verbal learning task to evaluate the potential mutual dependency between memory and executive functions (specifically the ability to encode and organize information). Although TMS has been shown to have a value in dementia patients, it has not been tested previously with Alzheimer's Disease (AD) biomarkers (i.e., cerebrospinal fluid, CSF).
Participants and Methods: 47 participants diagnosed with mild cognitive impairment (MCI) were recruited from a multicenter international study in Poland and Spain, with a mean age of 68.58 ± 10.03 years and a mean of 10.98 years of education. The sample was classified in two groups according to the Erlangen Score Diagnostic Algorithm (ESA): CSF - (n=11) and CSF + (n=36). Correlation analyses between the five TMS word-list conditions and CSF biomarkers were conducted. Additionally, an analysis of covariance (ANCOVA) was performed to define the effect on ESA classification in the sample, using as covariable the country of origin of the participants.
Results: Significant associations between the TMS-3 condition and AB42 ($r = 0.357$; $p< 0.05$), t-tau ($r = -0.307$; $p< 0.05$) and p-tau ($r = -0.337$; $p< 0.05$) were observed for the whole sample. When dividing the participants in CSF - and CSF +, the first ones obtained a higher cognitive performance in the TMS-3 compared to the possible AD group (CFS+). These outcomes persisted if the groups were divided according to Aβ42 scores ($p < .05$), but not concerning t-tau ($p = .50$) and p-tau values ($p =.49$). ANCOVA results with the two conditions of classification mentioned above (CFS - and CSF+) using the country of evaluation as a covariate showed statistically significant differences between groups in TMS 3 ($F (1, 41) = 12.21$, $p < .0010$, partial $\eta2 = .22$). This means that according to the ESA categorization, participants with normal values for CSF biomarkers have a higher cognitive performance in TMS-3 compared to those in the possible AD group.
Conclusions: Our results revealed an executive functioning impairment (mostly associated with TMS-3 condition) in patients with positive AD CSF biomarkers. This could be indicating that an early executive functioning impairment in MCI patients could be affecting their performance on episodic memory tests (verbal learning lists). These results could influence future intervention plans highlighting the importance of training executive functions in the context of memory tasks (abilities to encode and organize the information) in MCI patients, besides classic episodic memory training interventions.

03 Phonological and Semantic Features of Lexical Retrieval in Primary Progressive Aphasia

Marco Calabria[1] , Francesco Ciongoli[1] , Clara Martin[2] , Simona Mancini[2] , Sonia Marqués Kiderle[3] , Isabel Sala[3] , Nuole Zhou[3] , María Belén Sánchez-Saudinós[3] , Juan Fortea[3] , Alberto Lleó[3] , Ignacio Illán-Gala[3] , Miguel Ángel Santos-Santos[3]

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Objective: Research has identified at least two possible loci of origin for word-finding deficits: the first housed at the meaning level of processing (semantic) and the second at the phonological level (Schwartz, 2014). Recent findings showed that the linguistic variables associated with these two levels of processing differently modulate lexical retrieval in the three variants of the primary progressive aphasia (PPA) (Wonk et al., 2019). This suggests that semantics and phonology are key factors for explaining the origin of the word-finding deficits in this progressive disorder of language. With the current study, we aimed to explore the underlying mechanisms that link these two levels of processing and lexical retrieval by measuring the phonological and semantic blocking effects in patients with PPA.
Participants and Methods: Nine patients diagnosed with non-fluent PPA (nfvPPA, 4F/5M, mean age= 69.5 yo), nine with logopenic PPA (lvPPA, 3F/6M, mean age= 73.5 yo), and twelve controls (6F/6M, mean age= 66.7 yo) took part in this study. The classification of the two variants followed the clinical criteria for PPA by Gorno-Tempini et al. (2011) and was supported by neuroimaging and neuropsychological data.
All participants performed two cyclic naming tasks adapted from Calabria et al. (2020). In the semantic version, participants were required to name pictures in two conditions: (a) related, where pictures belong to the same semantic category (e.g., only animals), and (b) unrelated, where pictures belong to different semantic categories (e.g., animals, furniture, tools, etc.). In the phonological version, they named pictures in two conditions: (a) related, where pictures shared a phonological overlap in the initial segment of the word, and (b) unrelated, where pictures did not share the initial segment of the word. Analyses were performed on naming latencies and accuracy for each cyclic naming task.
Results: In both versions of the naming task, participants were slower in naming pictures from the related condition as compared to unrelated condition. However, accuracy performed showed differences between groups and task versions.
In the phonological version, both patient groups showed lower accuracy than controls (99.8%), but they were not different to each other (lvPPA: 85.6%; nfPPA: 90.9%, p= .22). In the semantic version, both patient groups showed lower accuracy than controls (99.8%) and they were different to each other (lvPPA: 82.3%; nfPPA: 92.7%, p< .05). Additionally, both patient groups were less accurate in naming in the related compared to unrelated conditions. However, the effect of item repetitions was significant in patients with lvPPA (from 74.1% to 88.2 %, p< .05) but not in those with nfPPA (from 90.1% to 92.4%, p= .4).
Conclusions: First, semantic and phonological contexts induce very similar effects on lexical retrieval that are better explained by interference (see Calabria et al., 2020). Second, the semantic features of lexical retrieval are more relevant than phonological ones in explaining the naming deficits in patients with lvPPA. Finally, the positive effect of item repetitions on naming in patients with lvPPA opens new perspectives for speech therapy.

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04 Anhedonia in Frontotemporal Dementia - Neural Substrates and Functional Implications

Siobhán Shaw [1,2] , Hashim El-Omar[1,2] , Tao Chen [1,2] , John Hodges [1,4] , Olivier Piguet [1,2] , Rebekah Ahmed [1,3,4] , Alexis Whitton[5] , Muireann Irish [1,2]

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Objective: The capacity to experience pleasure and respond to rewards is modulated by frontostriatal circuits in the brain. A breakdown in these circuits leads to the inability to experience pleasure, otherwise known as anhedonia. Recent studies have demonstrated clinically significant anhedonia in frontotemporal dementia (FTD), a collection of younger-onset neurodegenerative disorders characterised by progressive decline in personality, behaviour, and/or language function. Importantly, anhedonia in FTD has been shown to reflect a clear departure from premorbid levels and is dissociable from a general loss of motivation. How anhedonia relates to functional impairment in FTD remains unexplored, yet this could provide new insights

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into patient management. The objective of the present study was to demonstrate the prevalence and neural substrates of anhedonia, along with its functional implications, in a well-characterised sample of FTD patients.
Participants and Methods: A total of 164 participants took part in this study including 87 FTD patients, 34 Alzheimer's disease, and 51 healthy older Control participants. Within the FTD group, 55 cases were diagnosed with clinically probable behavioural-variant FTD and 24 presented with semantic dementia. Premorbid and current anhedonia was measured using the Snaith-Hamilton Pleasure Scale whilst loss of motivation, depression, apathy, and level of functional impairment were assessed used the Cambridge Behavioural Inventory-Revised, Depression Anxiety and Stress Scale, Dimensional Apathy Scale and the Frontotemporal Dementia Functional Rating scale, respectively. Voxel-based morphometry analysis was used to examine associations between anhedonia and patterns of grey matter atrophy in the brain.
Results: Relative to Controls, behavioural-variant FTD and semantic dementia patients showed a significant reduction in their current ability to experience pleasure. Voxel-based morphometry analyses revealed that anhedonia was associated with bilateral atrophy in the orbitofrontal cortex, medial prefrontal cortex, insular cortex, extending into the frontal pole. Importantly these regions were largely distinct from the neural correlates of apathy with only a small region of overlap in the right prefrontal region. Irrespective of diagnosis, anhedonia severity was significantly correlated with more severe motivational and functional impairment. Moreover, in bvFTD patients, anhedonia severity was found to mediate the association between motivational and functional impairment. Finally, regression analyses indicated that the increase in anhedonia from premorbid levels was more strongly predictive of functional decline in bvFTD, as compared to motivational impairment.
Conclusions: This study provides new evidence dissociating anhedonia from loss of motivation in FTD at the behavioural and neural levels. Our findings suggest that anhedonia is highly prevalent in FTD syndromes and reflects the breakdown of frontostriatal nodes of the brain's reward circuit. Importantly, anhedonia is highly predictive of functional impairment in bvFTD, raising serious implications for patient engagement and wellbeing in everyday life. Future studies exploring mechanisms of anhedonia in FTD will be crucial to develop targeted interventions to enhance quality of life for those affected with FTD.

Symposium 11: Challenges and Advances in Cross-Cultural Neuropsychology in Europe

Chair: Clara Calia
Presenters: Inmaculada Ibanez Casas, Clara Calia, T. Rune Nielsen, Pauline Narme, Alfonso Delgado-Alvarez

10:00-11:30h
Friday, July 8, 2022

SYMPOSIUM SUMMARY:

Challenges and Advances in Cross-Cultural Neuropsychology in Europe

Inmaculada Ibanez Casas[1] , Clara Calia[2] , Rune Nielsen[3] , Pauline Narme[4] , Alfonso Delgado Alvarez[5]

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[2]The University of Edinburgh, School of Health in Social Science, Edinburgh (UK)
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Neuropsychologists face new challenges as the world becomes more diverse. Most neuropsychological tests have been developed, validated, and normed in Western populations which leads to significant biases when applied to diverse populations. During the last decade, significant clinical and scientific research has been conducted to fill this gap. These issues are at the heart of the European Consortium on Cross-Cultural Neuropsychology (ECCroN) as illustrated by the talks presented by some members of ECCroN in this symposium. This symposium intends to address two important matters. First, we will clarify the challenges in the neuropsychological assessment of minority and ethnic groups and their implications for dementia diagnosis; Then, we will present advances in the development and validation of batteries or individual tests to assess neuropsychological performance in diverse

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populations. As a whole, the symposium will demonstrate ECCroN's commitment to developing a more cross-cultural approach to neuropsychology.

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01 European Consortium on Cross-Cultural Neuropsychology (ECCroN)

Clara Calia[1]

[1]University of Edinburgh

Over the past decades European societies have become increasingly diverse. This diversity in culture, education, and language significantly impacts neuropsychological assessment. Although several initiatives are under way to overcome these barriers - e.g., newly developed and validated test batteries - there is a need for more collaboration in the development and implementation of neuropsychological tests, such as in the domains of social cognition and language. To address these gaps in cross-cultural neuropsychological assessment in Europe, the European Consortium on Cross-Cultural Neuropsychology (ECCroN) was established in 2019. ECCroN recommends taking a broad range of variables into account, such as linguistic factors, literacy, education, migration history, acculturation and other cultural factors. We advocate against race-based norms as a solution to the challenging interpretation of group differences on neuropsychological tests, and instead support the development, validation, and standardization of more widely applicable/cross-culturally applicable tests. Last, ECCroN advocates for an improvement in the clinical training of neuropsychologists in culturally sensitive neuropsychological assessment, and the development and implementation of guidelines for interpreter-mediated neuropsychological assessment in diverse populations in Europe.

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02 The Timely Diagnosis of Dementia in Minority Ethnic Groups in Europe (TIMING) Project

T. Rune Nielsen[1]

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Objective: The aim of the TIMING project is to improve timely diagnosis of dementia in vulnerable minority ethnic groups by a) identifying enduring challenges in clinical practice for dementia diagnostics in minority ethnic populations in European memory clinics, and b) validating new brief case-finding tools in multicultural memory clinic populations to improve cross-cultural cognitive assessment.
Participants and Methods: Study a) is a survey among European clinical experts in the European Alzheimer's Disease Consortium (EADC) in which current challenges in clinical practice for dementia diagnostics in minority ethnic populations is identified and compared to the results from a previous survey in the same study population to inform recommendations for clinical practise. Study b) is a cross-sectional international multicenter diagnostic accuracy study in which the diagnostic performance of the Brief Assessment of Impaired Cognition (BASIC), BASIC Questionnaire (BASIC-Q) and other new measures for assessment of dementia and Mild Cognitive Impairment (MCI) will be explored and compared with the Rowland Universal Dementia Assessment Scale (RUDAS) and Multicultural Cognitive Examination (MCE). The study will include more than 100 majority and 100 minority ethnic patients and controls.
Results: Study a): By comparing survey findings with a previous survey from 2010, progress and enduring challenges within the field will be identified. Study b): Both BASIC and BASIC-Q incorporate cognitive testing, informant and patient report, can be applied in less than five minutes, and have shown superior diagnostic accuracy for dementia (AUC .92 vs .99) and MCI (AUC .67 vs .95) compared with the MMSE in a Danish population. Both instruments were designed with an aim to provide valid cross-cultural dementia case-finding tools and have been validated in Chinese populations without need for any cultural adaptions. The RUDAS and MCE have previously been validated across minority and majority groups across six European countries and the TIMING study is expected to proviude further evidence for the cross-cultural proporties of these instruiments. Preliminary findings for other new measures will also be presented.
Conclusions: With the identification of enduring challenges in clinical practice for dementia diagnostics in European memory clinics and the validation of effective case-finding tools in minority ethnic groups, we believe that the treatment of vulnerable minority ethnic groups will improve across the healthcare chain.

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03 Detection of Alzheimer's Disease in Multicultural Populations: What's new About the TNI-93 Memory test?

Pauline Narme[1] , Juliette Palisson[2] , Charlotte Joly[2] , Sara Morzyglod[2] , Kenza Benrahmoune[1,2] , Didier Maillet[3] , Catherine Belin[3] , Astrid De Liège[2] , Béatrice Garcin[2]

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[3]Assistance Publique-Hôpitaux de Paris (AP-HP), Hôpital Saint-Louis, Service de Neurologie, Paris, France

Objective: The TNI-93 memory test was developed and validated to detect dementia in low educated or illiterate multicultural patients. Recent psychometric evidence demonstrated the validity of the TNI-93 test in differentiating Alzheimer's disease (AD) in patients with biologically confirmed amyloid status. This study aimed to further improve the sensitivity of the TNI-93 for AD patients with hippocampus dysfunction by adding a new component: a 20min-delayed recall.
Participants and Methods: A retrospective cohort of 155 non-native French patients recruited from the Avicenne Hospital (mean age: 70 11; 50% female; 88% low-educated) underwent neuropsychological assessment in addition to medical examination and neuroimaging. Forty-four patients were diagnosed with AD whereas 111 were diagnosed with non-AD (n=31; vascular or other neurodegenerative disease; n=27 anxious and/or depressive syndrome; n=53; normal investigations). The neuropsychological assessment included the classical TNI-93 test, which is the encoding of nine images using a specific semantic categorical cue. This is followed by a 20 second interfering task, a free recall and a cued recall. The new component of a free and cued recall following a 20min delay was then added.
Results: Main results showed that (i) AD patients performed lower than non-AD patients on each score (free recall: respectively 4.9 2.1 versus 6.3 2.1; $p<0.001$; cued recall: 8.3 0.8 versus 8.8 0.6; $p<0.001$; 20min free recall: 3.2 2.5 versus 5.6 2.6; $p<0.001$; 20min cued recall: 7.1 2.4 versus 8.6 0.9; $p<0.001$); (ii) loss of information after 20min delay was larger in AD patients than non-AD patients in both free and cued recall (Delay * Diagnostic interaction, respectively: $F(1,153)=7$; $p=0.007$ and $F(1,153)=14$; $p<0.001$); (iii) ROC curves suggested that both 20min-delayed scores are better to discriminate AD patients from non-AD patients (20min free recall: Area under curve AUC=0.75; 20min cued recall: AUC=0.73) than 20 seconds free (AUC=0.69) and cued recall (AUC=0.66) from the classical procedure.
Conclusions: These results suggest that adding a delayed recall to the classical TNI-93 procedure increases the diagnostic value of the test. Consistent with our expectations due to major hippocampus dysfunction in AD, we showed a larger decrease in performance in AD patients than in non-AD patients after a 20min delay. This demonstrates that delayed scores might then be more sensitive in the earlier stages of the disease.

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04 Brain and Culture in Europe: the EMBRACED Battery

Inmaculada Ibanez-Casas[1] , Miguel Pérez-García[2] , Antonio E. Puente[3]

[1]State University of New York Plattsburgh (U.S.)
[2]University of Granada (Spain)
[3]University of North Carolina Wilmington (U.S.)

Our world is becoming more and more diverse as a result of globalization and migration movements. However, the field of neuropsychological assessment has not kept up with this diversity and people across the globe are being tested with instruments that are not culturally suited to them. Practitioners all over the world keep using tests that were originally created for Western culture(s) to evaluate patients of all demographic backgrounds and this creates a plethora of problems, including misdiagnosis and unfairness in testing.

Comprehensive neuropsychological assessments are complex and time-consuming procedures that require expertise and specialized training as well as a highly standardized administration, scoring, and interpretation of results. Additionally, in cross-cultural evaluations, practitioners face problems related to their own lack of linguistic and cultural competence, the scarcity of tests in some languages or cultures, and the lack of appropriate norms.

Experts agree that the solution lies in developing cross-cultural neuropsychological tests, and the addition of computerization makes these more usable and help us address many of

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the challenges we encounter in the clinical practice today. Computerization also provides the necessary infrastructure to advance the specialty of neuropsychology to places we couldn't possibly reach with the traditional paper and pencil tests. Examples of this include using an adaptive approach to testing, or the use of live norms, which improves fairness of testing. It also helps us address cross-cultural issues since computerized tests can easily be adapted to different cultures and administered in different languages, even if the practitioner does not speak that language.

There is no standard method for creating a battery that is comprehensive, modular, psychometrically robust, culturally relevant, free, and computerized. EMBRACED is the first neuropsychological battery that was developed with all these considerations in mind. The protocol for its development followed strict, evidence-based scientific methods for the identification of the neuropsychological domains and the best tasks to measure them. The tasks and stimuli were developed based on an extensive literature review and then computerized for its administration in a single iPad. The EMBRACED battery is user-friendly, cost-effective, and patient guided. In this presentation, we will describe the protocol for the development of this battery as well as our preliminary results with cross-cultural samples. Our results demonstrate that culture affects neuropsychological test performance in favor of Western populations and that EMBRACED is sensitive to this cultural variation.

Our specialty has the ethical responsibility to improve our instruments and to guarantee fairness in testing and in doing so, we also fight for social justice around the world. This is precisely the aim of the EMBRACED project.

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05 CCD and CNTB in Spain and Minority Population in Alzheimer, Parkinson, and Multiple Sclerosis

Alfonso Delgado-Alvarez[1] , Cristina Delgado-Alonso[1] , Laura Hernández-Lorenzo[2] , María Diez-Cirarda[1] , Rocío Garcia-Ramos[1] , Jorge Matías-Guiu[1] , Jordi Antem Matías-Guiu[1]

[1]Hospital Clínico San Carlos, Neurology
[2]Complutense University of Madrid

Objective: The continuous migratory movements in Europe have resulted in a shared space for coexistence with a great cultural, linguistic, and educational diversity. However, this challenges the validity of traditional neuropsychological tools, and cross-cultural instruments deem necessary. We aimed to validate the Cross-Cultural Dementia Screening test (CCD) and the European Neuropsychological Test Battery (CNTB) in a wide range of patients with cognitive disorders, including patients with Alzheimer's Disease (AD), Parkinson's Disease (PD), and multiple sclerosis (MS), considering participants from a majority population (Spaniards) and a minority population from Latin America.
Participants and Methods: Two hundred and sixty participants were enrolled, 130 healthy controls and 130 patients: 55 AD, 45 cognitively impaired MS, and 30 cognitively impaired PD. Each clinical group was matched with a control group with no differences in age or years of education. All participants completed a standard battery of neuropsychological assessment co-normed in our country, CCD, and CNTB. Student's t test or Mann-Whitney's test were performed for intergroup comparisons with quantitative measures. Chi-squared test was calculated for categorical comparisons. Pearson's correlation coefficients were calculated to study the relationship between quantitative variables. Analysis of ROC curves and binary logistic regression were performed to study the classification accuracy of CCD and CNTB. Machine learning algorithms were developed for classification between groups and feature selection.
Results: There were statistically significant differences between healthy controls and each clinical group in CCD and CNTB considering majority and minority samples. Areas under the curve for CCD and CNTB subtest ranges from .501 to .961. Regarding CCD, Objects test Part A and Part B were especially useful for a correct classification of >90% for each diagnostic group. Considering CNTB, Recall of Pictures Test, Enhanced Cued Recall, Color Trails Test, and Five Digit Test were significant variables for different clinical conditions and also achieved an adequate classification. Correlations between CCD / CNTB measures with standard neuropsychological tests of NN battery were moderate - high, showing concurrent validity. Influence of age and years of education in test performance was low.
Conclusions: CCD and CNTB showed good psychometric and diagnostic properties to assess patients with AD, MS, and PD from majority and minority populations. Our study provides a framework for neuropsychological assessment in cross-cultural settings, selecting the most

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meaningful tests for each context (screening, full assessment) and disorder (AD, PD, MS).

Coffee Break

11:30-12:00h
Friday, July 8, 2022

Poster Session 04

11:30-12:00h
Friday, July 8, 2022

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01 Executive Function is More Predictive than Pain for Psychological Experiences in Older Adults with Diabetes

Hsiao-Ting Ho[1] , Sang-I Lin[1,2] , Nai-Wen Guo[1,3] , Yi-Ching Yang[4,5] , Ming-Hsing Lin[4] , Chong-Shan Wang[5,6]

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[6]Alian Health Clinic, Kaohsiung City, Taiwan

Objective: Patients with diabetes have a poor quality of life (QoL) and emotional experience (EE) than those without diabetes. Previous studies have consistently suggested pain experience to be a significant contributor to QoL and EE. Since successful diabetes self-care behaviors heavily depend on executive function (EF), and the results from studies conducted on different patients have shown that EF is crucial to the development or deterioration of QoL and EE, we hypothesized EF would critically influence QoL and EE in people with diabetes. Therefore, this study with a longitudinal design aimed to investigate the influence of EF on current and future QoL and EE in older adults with diabetes.

Participants and Methods: A total of 128 older adults with diabetes were recruited in the study. The information about their demographic variables (age, gender, education), health and medical conditions (hemoglobin A1c levels, body mass index, numbers of medication, pain severity), functional capacities (ADL, IADL, the required level of cognitive and emotional care, pain interference), cognitive function (general cognitive ability, EF), QoL, and EE were collected in the 1st year. QoL and EE were reassessed in 98 participants in the 2nd year and in 63 participants in the 3rd year. Pearson's correlation coefficient analysis and stepwise multiple linear regression analysis were performed to determine the predictors of QoL and EE in each year. Besides, Cohen's f^2 was applied to calculate the effect size (ES).
Results: EF was the strongest predictor for overall QoL in all 3 years, which contributed 31.5% (ES = 0.46), 36.2% (ES = 0.57), and 23.0% (ES = 0.30) of the variability at the 1st, 2nd and 3rd year. EF was also the strongest predictor for EE in all 3 years, which contributed 13.2% (ES = 0.15), 17.1% (ES = 0.21), and 11.1% (ES = 0.13) of the variability, respectively. The second strongest predictor for overall QoL in all 3 years was pain interference, which contributed 8.3% (ES = 0.09), 7.0% (ES = 0.07), and 10.0% (ES = 0.11) of the variability, respectively. Pain interference was also the second strongest predictor for EE in the 2nd year, which accounted for 5.5% (ES = 0.06) of the variance.
Conclusions: The present study revealed that even though pain experience does have a significant influence on QoL and EE, EF is more predictive than pain experience for QoL and EE in older adults with diabetes. Since EF is the most important predictor for the current and future QoL and EE, we proposed a long-term influence of EF on QoL and EE in older adults with diabetes. Besides, we suggested enhancing EF can be an effective step to improve the QOL and EE among older adults with diabetes. Thus, we recommend that EF be included as an indicator for diabetes surveillance, and that prevention of EF decline be a part of diabetes management plans.

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02 Facial emotion recognition in Parkinson's disease: the role of executive and affective domains

Antonia Siquier[1] , Pilar Andres[1]

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Objective: The ability to recognize emotions from facial expressions may be impaired in Parkinson's disease (PD). However, it is not fully established whether emotion recognition deficits in PD should be considered as a primary non-motor symptom due to the dopaminergic deficit or as dependent on the executive deficits and affective disturbances commonly present in these patients. There are also methodological factors, such as the level of dynamism and intensity of emotion expressions, that may determine FER. We aimed to explore facial emotion recognition (FER) skills in individuals with PD by using a dynamic presentation of emotions across different intensities and to examine the extent to which executive and affective alterations contributed to FER deficits.
Participants and Methods: Fifteen individuals with PD and 15 healthy controls were assessed on the Emotion Recognition Task (ERT). We also explored how clinical and executive factors could contributed to ERT accuracy.
Results: Individuals with PD showed poorer performance on the ERT, specifically on angry expressions, but they benefited from increased intensity as much as controls did. Differences were also found for depression and executive tests, especially in the inhibition domain. Importantly, both measures were related to the ability to recognize angry faces. Finally, inhibition dysfunction was the strongest predictor of ERT and anger performance.
Conclusions: Emotion recognition deficits of morphed facial expressions have been found in individuals with PD. Moreover, inhibition dysfunctions may act as an important factor negatively influencing FER. In that sense, the present study highlights the complex nature of emotion processing and its relation with emotional-affective and cognitive aspects to provide a better understanding of FER deficits in PD.

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03 Parental Education Level and English Proficiency: Influences on the Spanish BRIEF-2

Glena Andrews[1] , Natalia Rich-Wimmer[2]

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[2]George Fox University, Graduate School of Clinical Psychology, USA

Objective: Culturally informed interpretation of neuropsychological test performance is increasingly important as the Hispanic population of the United States increases, 55% since the early 2000s (Burton, et al., 2012). The performance of Hispanic students on school based assessments was significantly lower than that of peers within the dominant population in the U.S. (NCES, 2016). Further, the average educational attainment level within the Hispanic population continues to be the lowest percentage in the nation (high school education 66%, bachelor's degree or higher 10%; U.S. Census, 2015). Despite pervasive cultural differences between the Hispanic community and dominant-culture children, including the 26 different cultures in the classification of Hispanic (Burton, et al., 2012), Spanish-speaking children are continually compared to norms derived from the dominant culture on assessment instruments. Cultural differences may confound expectations of child development, leading to the over-pathologizing of Hispanic children, particularly when using parent questionnaires (Burton, et al., 2012; Zamarripa & Lerma, 2013). Traditional child development theories are based on observations of what is commonly termed a WEIRD population, Western, Educated, Industrialized, Rich, and Democratic (Henrick, et al., 2010; Arnett, 2016; Packer, 2017). This population represents approximately 5% of the world, contributing to multiple challenges in overgeneralizing theories to diverse communities (Arnett, 2016; Packer, 2017). Research demonstrates that socialization goals within different cultures vary depending on the family's socio-economic status, education levels, and worldviews (Kärtner, et al., 2011). For example, Mexican and Costa Rican mothers often emphasize the importance of higher social skills rather than cognitive abilities, whereas European-American mothers emphasize the significance of cognitive skills and independence (Kärtner et al., 2011; De Oliveira & Nisbett, 2017).
Participants and Methods: The present study investigated differences on the Spanish BRIEF-2 (Gioia et al., 2015) scores across Spanish-speaking subgroups based on parents' English proficiency and education levels. We hypothesized we would find divergent ratings for children based on their parents' understanding of English. Using a snowball method, the sample included 41 children, ages 5-18 years, with Spanish-speaking parents residing in the US. Parents were administered the BRIEF-2 via telephone due to COVID restrictions.
Results: The child's age, as well as parents' English proficiency and education levels significantly influenced scores on the BRIEF-2 Spanish Version. Parents of children ages 8-12 endorsed more deficits in global executive

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functioning and cognitive regulation than parents with children in the 5-17 and 13-18 age groups. Parents with limited English proficiency were more likely to rate their children with behavioral dysregulation than parents with bilingual or native English proficiency. Mothers with a middle school education were more likely to endorse difficulties with global executive functioning and emotional regulation skills in their children than were mothers with higher education levels.
Conclusions: Findings highlight the need to interpret the results of the BRIEF-2 Spanish Version through a diversity-informed framework in order to avoid over-pathologizing children from Hispanic backgrounds. Attention must be paid to the education levels and English proficiency levels of the Spanish-speaking parent raters even with the Spanish version of the BRIEF-2.

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04 The Executive Function of VLBW and ELBW Preterm Children with Normal Early Development

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Objective: Many studies had shown that preterm children with very low birthweight (VLBW) / extremely low birth weight (ELBW) were at high risk of executive function (EF) deficits, including impulsive control, working memory, set shifting. However, former studies didn't rule out the influence of abnormal early development on EF deficits. The present study aims to evaluate whether VLBW / ELBW preterm children with normal early development have EF deficits and the EF difference between VLBW and ELBW preterm children.
Participants and Methods: The preterm children were recruited from the Regional Cohort Network for premature infants who were admitted to neonatal intensive care units. Inclusion criteria were their scores of Bayley Scales of Infant and Toddler Development, second or third edition at 12 and 24 months, and Wechsler Preschool and Primary Scale of Intelligence, Revised Edition at 5 years old were higher than 70. Exclusion criteria were visual impairment, hearing impairment, and cerebral palsy. There was a total of 304 preterm children recruited in the present study. Preterm children were then divided into VLBW and ELBW groups. The VLBW group included 217 preterm children with age 6, whose birthweight are between 1000-1500g, and gestational age are less than 37 weeks. The ELBW group included 87 preterm children with age 6, whose birthweight are less than 1000g and gestational age are less than 37 weeks. The control group included 114 term-born healthy and typically developing children with age 6, who were recruited from comparable social status (SES) families from local schools. Four types of executive function were assessed. Inhibition was assessed through Comprehensive Nonverbal Attention Test Battery (CNAT), cognitive flexibility was assessed through Wisconsin Card Sorting Test (WCST), verbal working memory was assessed through Digit Span Subtest of Wechsler Intelligence Scale for Children-IV (WISC-IV), nonverbal working memory was assessed through Knox's Cube Test (KCT), and planning ability was assessed through Tower of London (ToL). Data were analyzed with one-way ANOVA and Scheffe post hoc test.
Results: Results showed that there were significant differences (p<.05) in five out of six indexes of WCST, Backward score of Knox's Cube Test, and four out of six indexes of ToL between three groups. In Scheffe post hoc test, the control group performed significantly better (p<.05) than VLBW and ELBW group, and there were no significant differences between the VLBW and ELBW group in all indexes, except perseverative errors of ToL. As to the indexes of CNAT and LDSB of Digit Span of WISC-IV, results showed no significant difference between the three groups.
Conclusions: VLBW and ELBW preterm children with normal early development have poorer cognitive flexibility, nonverbal working memory, and planning ability compared to term children, while there are no significant differences in inhibition and verbal working memory. In addition, ELBW preterm children show more perseverative behavior when planning than VLBW preterm children.

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05 Impaired Executive Functioning Associated with Alcohol Use Disorder and Alcoholic Korsakoff's Syndrome

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Objective: Impaired executive functioning is often reported in alcohol-related cognitive disorders including Korsakoff's syndrome (KS). Deficits may persist after long term abstinence from alcohol, affecting a patient's ability to adapt to changing circumstances and overseeing behavioral consequences. This study aims to directly compare executive function in patients with alcohol use disorder (AUD), alcohol induced KS, and a sample of healthy controls using a computer based cognitive assessment battery.
Participants and Methods: The three main subdomains of executive function were assessed, i.e., shifting, updating and inhibition, using four subtasks of the Cambridge Neuropsychological Test Automated Battery (CANTAB): Spatial Working Memory (updating and strategy use), Intra-Extra Dimensional Set Shift (reversal learning and set shifting), Rapid Visual Information Processing (inhibitory control) and Stockings of Cambridge (spatial planning and working memory). Performances of 22 patients with AUD (mean age 57.2) and 20 patients with KS (mean age 55.3) were compared to thirteen matched non-alcoholic controls (mean age 46.5). ANOVAs were conducted to examine group differences. Groups did not differ on estimated premorbid intelligence scores (overall NART-IQ M=89.0; SD=24.2; p= .753).
Results: Significant group differences were found on both the capacity and efficacy of working memory (updating), set-formation, rule acquisition and overall planning and strategy skills ($p<.05$). Although healthy controls performed significantly better compared to AUD and KS patients, no differences were found between the AUD and KS groups. Response latency and reversal learning scores showed a stronger performance for controls compared to KS, but not for AUD. Although there was a general trend towards a stronger performance on tasks of inhibitory control for controls followed by AUD and KS, these results did not reach significance.
Conclusions: Compared to healthy controls, patients with AUD and KS showed significant executive impairments, which were most prominent in updating, set-shifting and general planning abilities. Furthermore, results showed a similar ability of self-control and environmental adaptation in patients with AUD and patients with KS. Foregoing highlights executive disability as a significant hallmark of AUD and stipulates the importance of early assessment and evaluation of executive skills to guide treatment.

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06 Executive Attention, Internalizing Symptomatology, and the Moderating Effects of Rejection Sensitivity

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Objective: Executive attention (EA), the neurocognitive correlate of effortful control, allows one to shift attention from negative thoughts to neutral or positive thoughts. While the link between EA and externalizing symptomatology has been established, evidence explaining why individuals develop IS, rather than externalizing symptomatology, is limited. Prior research supports that those high in rejection sensitivity (RS) are more likely to develop IS; however, this relationship has not been investigated while also measuring levels of EA. We hypothesized that RS would moderate the relationship between EA and IS in young adults; such that the negative relationship between EA and IS will be amplified in those high but not low on RS.
Participants and Methods: 117 undergraduate students completed the Attention Network Task (ANT), the Brief Symptom Inventory (BSI), and the Rejection Sensitivity Questionnaire (RSQ).
Results: EA was not correlated with RS or IS and did not interact with RS to predict increases in IS.
Conclusion: This may be due to the heteromethod convergence problem and the role of other attention processes within effortful control (i.e., alerting. orienting), suggesting dissociable relationships between attention processes and particular clinical presentations.

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07 An intervention of Executive Functions to Improve the Academic Performance in Students of Primary School

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Objetivo: El propósito de esta investigación fue determinar la efectividad de un programa de intervención en las funciones ejecutivas de los estudiantes de 5° grado para mejorar su rendimiento académico.
Participantes y Métodos: Los participantes procedían de instituciones educativas de las ciudades de Bogotá, Armenia e Ibagué, en Colombia. La muestra estuvo conformada por 90 niños y niñas de 9 a 11 años, y la investigación fue cuasiexperimental pretest-postest. Para la identificación del rendimiento académico se tomó el promedio de calificaciones en las clases básicas y se utilizó una Batería de Evaluación Neuropsicológica de las funciones ejecutivas de los niños. Posteriormente se diseñó e implementó el programa de intervención "Psiconit" durante cuatro meses. A los dos meses de la implementación del programa se evaluó al total de la población.
Resultados*:* Los resultados obtenidos se analizaron realizando una correlación bivariada de variables continuas, y el coeficiente de correlación de Spearman. Se observó que el entrenamiento de las funciones ejecutivas a través del programa mejoró de manera significativa, específicamente en la planificación, velocidad de procesamiento de la información, inhibición y flexibilidad cognitiva. Además, los resultados indican que los estudiantes con rendimiento académico categorizado como superior alto obtuvieron mejores resultados en todas sus subpruebas, en contraste con los estudiantes con nivel básico bajo.
Conclusiones: Finalmente, se verificó que existe una relación entre las funciones ejecutivas y el rendimiento académico. Los componentes que tuvieron una relación estadísticamente significativa fueron: planificación, anticipación, inhibición y flexibilidad cognitiva. El programa de intervención es eficaz para el entrenamiento de las funciones ejecutivas.

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08 Neurocognitive Operations Underlying Executive Abilities: An Analysis of Latency and Time-Based Parameters

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Objective: The theory of executive attention suggests considerable plasticity regarding when specific neurocognitive operations are recruited to bring executive tasks to fruition. We tested the hypothesis that differing neurocognitive operations are recruited upon the initiation of a response, but that other distinct neurocognitive operations are recruited towards the middle or end of a response.
Participants and Methods: The Backward Digit Span Test (BDST) was administered to 58 memory clinic patients (MCI, n= 22; non-MCI, n= 36). Latency to generate all correct 5-span responses was obtained. First and third response latencies and a BDST-response ratio (RR) that combined first and third response latencies were analyzed in relation to verbal working memory (WM), visual WM, processing speed, visuospatial operations, naming/ lexical access, and verbal episodic memory tests.
Results: For the first response, *longer or slower* latencies were associated with *better* performance in relation to verbal WM and visuospatial test performance. For the third response, *shorter or faster* latencies were associated with *better* processing speed and visuospatial test performance. For the BDST-RR, non-MCI patients were 3/4th second slower in generating correct first and third responses than MCI patients. Regression analyses found that visuospatial tests were highly associated with the BDST-RR.
Conclusions: Consistent with the theory of executive attention, these data show that the neurocognitive operations underlying successful executive test performance are quite nuanced with differing neurocognitive operations associated with specific time epochs. Results support the efficacy of obtaining time-based latency parameters to help disambiguate successful executive neurocognitive operations in memory clinic patients.

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09 Effects of Confinement During CoVID-19 in Executive Functions in Development: Preliminary Results

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Objective: In March 2020, a 100-day lockdown began in Spain due to the CoVID-19 health crisis. Consequently, all the children's daily routines and activities changed radically: online school, the impossibility of carrying out outdoor activities, and limited social contact.
These changes could have caused a greater demand for Executive Functions (EFs), mainly those necessary to adapt to the new situation and self-regulate behaviors and emotions. In addition, factors such as stress and a lack of physical exercise could have negatively affected children's-cognitive performance, leading to the appearance of disruptive behaviors and emotional problems.
The present research aims to study the effects of the confinement situation on the EFs and its impact on emotional and behavioral problems in children.
Participants and Methods: We performed an online longitudinal study-involving 21 families with children between 6 and 17 years old. The child's primary caregiver filled out the BRIEF-2 (family version) as a measure of EF in two different moments: in July 2020, Phase 1 (P1), right after the confinement, and in October 2020, Phase 2 (P2). We also included a second questionnaire about family home features and family routines during confinement in the first data collection. Finally, we included a brief evaluation of the EFs of the primary caregiver retrospectively before and during confinement, based on some representative items of the BRIEF-2 adapted to adult behavior.
Results: Our findings showed positive correlations between caregivers' EFs measures before confinement and behavioral, emotional, cognitive, and global regulation indices from BRIEF-2 at P1 and P2: The better the adult's adaptation to confinement, the better the adjustment and regulation of emotions of their children after that confinement, both at P1 and P2. Interestingly, the score in these indices decreased significantly from P1 to P2, except for the emotional regulation index that was not significant. Specifically, in the case of the behavioral regulation index, the change between P1 and P2 was significantly more pronounced in boys than in girls.
Conclusions: The present research contributes to the growing body of evidence suggesting that confinement affected the EFs of children and adolescents, especially in the emotional area, in which those effects were longer over time. Moreover, it highlights the importance of the parents' EFs as a protective factor against contextual changes.

10 Influence of a Physical Activity Self-Monitoring Record on Attentional Ability

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Objective: Numerous research investigations support the positive effect of physical activity on neurocognitive processes. Besides, there is an important benefit of visualization on cognitive abilities when it is linked to self-monitoring the physical activity. This research explores whether physical activity practice is affecting attentional skills when the person is using a self-monitoring record. The objective is to find out if there are significant improvements on the attentional ability in people who increase their PA during one-month self-monitoring recording it or not.
Participants and Methods: The sample consisted of 34 people, whose age range was between 18 and 35 years old. Half of them were self-monitoring recording their physical activity and the other half were not. A quasi-experimental pre-post study with a non-equivalent control group design was applied. Attention was measured with 3 tests (D2 Attention Test; Trail Making Test (TMT); and Digits Test). A mixed ANOVA was used with pre-post as within-subjects factor and conditions (self-monitoring recording or not) as between-subjects factor.
Results: Significant higher scores were obtained in final attention tests after doing one month of physical activity. No differences were found between participants who use a self-monitoring record of the physical activity and those who did not use it. There were no interaction effects between factors.
Conclusions: The differences found highlight a positive relationship between physical activity and attentional ability. However, self-monitoring recording the activity seems to have no effect on attention. A more adequate self-monitoring record system and longer training is suggested to improve with the aim of providing

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tools that can impact positively in the cognitive health of the population.

11 Arithmetic Skills of Young Adults with ADHD

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Objective: ADHD is a neurodevelopmental disorder, characterized by the presence of inattention and hyperactivity/impulsivity symptoms (American Psychiatric Association, 2013). These symptoms can interfere and generate difficulties in academic skills such as mathematics and problem solving. Academic skills have been widely explored in children with ADHD (Benedetto-Nasho & Tannock, 1999), however, studies in adolescents and young adults with ADHD are limited.
The aim of the present study was to characterize arithmetic skills of youth with ADHD symptoms identified in childhood.
Participants and Methods: 46 participants (age range between 15 to 23 years old) were included. We conformed 2 groups: ADHD group (8 female and 22 men with ADHD symptoms identify in childhood) and Control group (5 female and 11 men). Arithmetic sub-test of the WRAT-3 (Wilkinson, 1993) was applied to all participants. Statistical analysis was performed using SPSS 20 program.
Results: ADHD group (median=17.67) showed lower total score in Arithmetic sub-test (WRAT-3) compared to the control group (median=24), U= 84, z= -3.606, $p< .001$.
Conclusions: In summary, we found that youth with ADHD history showed lower arithmetic skills compared to typical population. These data suggest the presence of arithmetic difficulties in adolescents and young adults with ADHD symptoms identified in childhood. It is important to emphasize early diagnosis and intervention of academic skills on this population.

12 Improving Learning in ADHD: Relevance of Attentional Capacity in the Use of MI and SG Techniques

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Objective: Attention Deficit Hyperactivity Disorder (ADHD) is a common disorder that affects family, social and school functioning. Although there are interventions in ADHD, their benefits are limited. Mental imagery (MI) and self-generation (SG) are two techniques that have been shown to improve learning in different population.
Objectives: (1) to evaluate the existence of groups according to the attentional ability of the students, (2) to contrast the emerging groups with the samples of ADHD and typically developing students. And (3) to evaluate whether the usefulness of MI and SG techniques to improve learning depends on the attentional capacity of students with ADHD.
Participants and Methods: 50 ADHD and 92 with typical development students received a lesson, through LISA application. Each participant received the lesson through only one of three techniques: MI, SG or through traditional teaching (TR). The lesson was evaluated immediately and a week later.
Results: The groups according to attentional ability differ from the initial samples. In addition, it was found that none of the techniques used is better than another to improve the learning of new information in ADHD students. Furthermore, MI technique only improve the learning of new information on students with high attentional ability. Regarding the SG, the technique seems to reduce the learning of students with low attentional ability. The results suggest that the effectiveness of the techniques to improve the learning of new information depends on the attentional ability and not on the diagnosis.

13 Perception of Symptoms and Mental Health of Parents of Children with ADHD

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Objective: This study aimed to describe the relationship between Latin American parents' perception of the behavioral characteristics of

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their children with ADHD and (1) their own mental health, (2) their quality of life, and (3) their couple relationship.
Participants and Methods: Sixty parents of children with ADHD from Guatemala and Colombia were interviewed individually. Standardized questionnaires were used to evaluate symptoms of depression (PHQ-9), state and trait anxiety (STAI), burden (Zarit Burden Interview), satisfaction with life (Satisfaction with life scale), health-related quality of life (SF-36), and self-efficacy (Self-efficacy for coping with stress scale). In addition, parents answered the Child Behavioral Check List (CBCL) to describe their perception of the symptoms of their children with ADHD. Analysis of canonical correlations was carried out, in order to evaluate the existing relationship between the constructs.
Results: In general, the results show that a greater perception of symptoms is related to a poorer mental health and a poorer quality of life. Perceived externalizing symptoms were the characteristic with a greater relationship with poorer parents' mental health and quality of life. Likewise, a greater perception of self-efficacy is related to a better mental health. No relationships were found between mental health and couple relationships, nor between parental quality of life and perceived self-efficacy.
Conclusions: There is a relationship between specific behavioral symptoms and problems in some dimensions of mental health and the quality of life of parents with ADHD. Thus, the findings would be an important input for the design of personalized programs for the care of parents of children with ADHD, prioritizing attention to the most relevant areas according to the perception of symptoms and, therefore, of great value for clinical care.

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14 Interference effect from visual peripheral distractors in deaf children

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Objective: Flanker tasks are one of the most used experimental tasks to study one of the important functions of executive attention: ability to suppress the interference of distractors. In this kind of tasks participants must attend and respond to a central stimulus (à), while ignoring peripheral flankers to both sides of the central target. Flankers can be congruent to the target (à) or incongruent (ß). In these tasks, the flanker interference effect (higher response times and/or lower accuracy in incongruent trials than in congruent trials) is used as an indirect measure of the ability of the subject to resist or suppress the interference of distracting information. However, the validity of this task has been put in doubt when using it in deaf population. As data in scientific literature suggest that there is further allocation of attention to the periphery in deaf, it is possible that differences in this paradigm are not due to difficulties in executive attention but higher attention to flankers (distractors) in the periphery. Therefore, the main objective of this study was to explore the effect of flanker interference in function of the degree of eccentricity in prelocutive deaf children. In previous studies with normal hearing subjects there are consistent results of a lower interference when the distance between target and flankers is over 1º of visual angle. In deaf children, if such further of allocation of attention to periphery contributes to the difficulty of suppressing the interference of peripheral distractors, we shouldn't find a reduction in interference effect when increasing the degree of eccentricity of distractors.
Participants and Methods: A total of 17 deaf children between 6 and 11 years old participated in this study. A flanker task adapted for children was used. In this task participants had to indicate the direction of the central stimuli (a rocket) pressing the appropriate mouse button while ignoring flanking distractors that could be in the same direction (congruent) or the contrary one (incongruent). Three level of eccentricity between flankers were used (no separation between flankers, 1º visual angle separation, or 2º).
Results: Repeated measures ANOVAs with eccentricity and congruency (flankers distractors) as intra-subject variables were used. As expected, we found a main effect of congruency (response times in incongruent trials were significantly slower than congruent ones). A main effect of eccentricity (showing faster responses when the distance between flankers increases), however, no interaction between eccentricity and congruency (there is no increase of congruency effect with further distance).
Conclusion: These results suggest that the flanker task could be an adequate measure of executive attention in deaf children. It is possible that this allocation of attention to the

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periphery has not been developed enough to be able to interfere in the performance of this task at this age range.

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15 Age moderates the relation of mentalization and multidimensional emotion perception in children

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Objective: Emotion recognition has been traditionally measured trough the recognition of emotional expressions of static faces. However, the literature regarding other emotional domains such as voice or body movements reveals they are relevant in the process of emotion recognition. Studies suggest that emotion recognition is progressively acquired from early stages in our infancy to adulthood, as well as other domains of social cognition such as mentalization or Theory of Mind. The goal of this research was to test the relationship between emotion recognition of children and mentalization over time, since we hypothesized that age moderates this relationship.
Participants and Methods: A total of 545 children and adolescents from 8 to 15 year-old participated in the study (250 male/295 female). Assessments were carried out in groups. All participants fulfilled Social Attribution Task-Multiple Choice (SAT-MC) or SAT-MC-II, Bell-Lysaker Emotion Recognition Test-Spanish Version I and II (BLERT-SI and BLERT-SII).
Results: As expected, Spearman correlational analysis showed that age correlated with SAT-MC *(r*=57, p≤000) and BLERT-MC *(r*=28, p≤000), as well as both social cognition measures were related *(r*=41, p≤000). The moderating effect of age in the relation between the mentalization and multimodal emotion recognition was tested using macro PROCESS 3.5 script (Hayes, 2017). Model 1 was selected and 5000 samples for bootstrapping was used. When using age as a moderator, 24% of the variance was explained by mentalization ($F_{(1,526)}$=54.81, p≤0.000, R^2=0.24). More specifically, as age increases, the effect of mentalization on multidomain emotion recognition decreases (β=-0.04, $t_{(526)}$=-2.34, p=0.019). Analysis of the conditional effect of age at -1 SD, 0 SD and +1 SD (9, 12 and 15 years old respectively) show a positive and significant effect of mentalization on the multimodal emotion recognition. Although they all remain significant, the effects decrease over time ($\beta_{9\text{ years old}}$=.53, $s.d$=0.6, p≤0.000), ($\beta_{12\text{ years old}}$=.42, $s.d$=0.41, p≤0.000) and ($\beta_{15\text{ years old}}$=.31, $s.d$=0.62, p≤0.000).
Conclusions: Therefore, our results confirm that the development of social cognition is progressive. In addition, they suggest that the relation between multimodal emotion recognition and mentalization vary throughout the development of children. This is probably due to the underneath developmental processes of both domains.

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16 Emotion Regulation in Monozygotic Twins: a Cross-Sectional Study

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Objective: Emotional Regulation (ER) is the ability to influence the course of emotions in oneself and in others that involves mechanisms such as initiating, managing, modulating or altering the occurrence, intensity or duration of affective states. ER skills are an important aspect of a healthy social and emotional life. Impaired ER is associated with mental health disorders, with particular relevance to mood symptoms. The present research analyzes the correlation of ER and Emotional Lability among monozygotic twins (that shares 100% of their genes).
Participants and Methods: We used the Emotion Regulation Checklist (ERC) questionnaire of hetero-evaluation in it's validated version for the Brazilian culture. This scale is composed of two subscales: 1. ER, focused on the evaluation of emotion expression, empathy, and emotional self-awareness; 2. Emotional Lability/Negativity (L/N) that assesses mood lability, the lack of flexibility and anger dysregulation.To assess zygosity, we applied the questionnaire used in the Danish Twin Register. The scales were answered by the twins' caregivers (mostly mothers).
Results: The sample consisted of 11 monozygotic twin pairs aged 8 to 12 years old (M= 9.17, SD=1.28), 68.75% of the participants were female. Intraclass Correlation Coefficient (ICC(3)) revealed no significant correlation of ER skills in monozygotic twins(ICC=0.43,f

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p=0.19). However, high significant correlation was found regarding emotional lability (ICC=0.84, p<0.01).
Conclusions: The presented study is in line with previous research showing moderate heritability for personality traits related to emotionality. However, our results suggest that discrete emotion regulation domains should be considered to analyze the heritability level of this construct. High correlation of emotional ability in monozygotic twins suggests a greater influence of genetic aspects in this domain. while the non-correlation with RE skills highlights the role of the environment in the development of these skills.. Limitations regarding sample size in the present study should be accounted for. Future research with larger samples and comparing monozygotic and dizygotic twin pairs may provide further information about genetic and environmental influences on different aspects of emotion regulation.

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17 Altered Executive Functions in Adolescents with Problematic Smartphone Use

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Objective: There are many studies that show that executive functions (such as inhibition or cognitive flexibility) play a very important role in the development and maintenance of various types of addictions (substance abuse, food addiction, gambling disorder or Internet addiction). Due to this reason and the high and growing prevalence of problems derived from abusive use of smartphones, the objective of this study is to evaluate the dimensions of executive functions in adolescents with and without abusive use of smartphones.
Participants and Methods: 107 adolescents (68 women and 53 men) between 13 and 18 years old (M=15.71; SD=1.81) completed the Smartphone Addiction Scale (SAS-SV; Kwon, Kim, Cho & Yang, 2013) in its Spanish version (adapted by Lopez-Fernandez, 2017). This made it possible to divide the participants into two groups: excessive smartphone users and non-excessive users. They were also evaluated by their parents using the Behavior Rating Inventory of Executive Function-2 (BRIEF-2; Gioia, Isquith, Guy, & Kenworthy, 2015) in its Spanish version (adapted by Maldonado, Fournier, Martínez, González, Espejo-Saavedra, & Santamaria; 2017). This instrument shows a high ecological validity, since it evaluates the executive functions of adolescents based on the behaviors they show in their daily lives; both at a global level and of the different dimensions that compose them: Inhibition, Self- monitoring, Flexibility, Emotional control, Initiative, Working memory, Planning and organization, Supervision of the task and Organization of materials.
Results: Significant differences were found in the global index of executive function between both groups (t=2.756; p=.007), with greater difficulties in these skills in those participants who showed abusive use of the smartphone (M=56.89; SD=11.255) compared to the non-excessive use group (M=51.52; SD=8,765). Specifically, the dimensions of the executive functions that were most affected in the group of participants with a dysfunctional use of this device were: flexibility (t=2.148; p=.034), self-monitoring (t=2.540; p=.013), emotional control (t=2.888; p=.005) and initiative (t=2.622; p=.010).
Conclusions: These results suggest that adolescents with a higher level of smartphone abuse show greater difficulties in regulating their own behaviour and emotional responses, especially in response to changing situations. Therefore, we can affirm that executive functions, as in other addictions, play a fundamental role in understanding the mechanisms that underlie smartphone abusive behaviour, which is already considered by some authors as a behavioural addiction.

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18 Differences in Emotion Recognition Between Various Neurological Disorders.

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Objective: Social cognition disorders can develop after brain damage. Impairments in aspects of social cognition, including emotion recognition, are disorder-transcending and can occur in various neurological disorders such as traumatic brain injury (TBI), stroke (including Subarachnoidal Hemorrhage (SAH)), brain

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tumours (low-grade gliomas; LGG's) and Parkinson's disease (PD). It is, however, not known if and how patients differ with respect to the extent to which overall emotion recognition as well as recognition of the individual emotions (anger, disgust, fear, happiness, sadness, surprise) are impaired. The aim of this study, therefore, is to investigate if and how various neurological patient groups diverge in their pattern of emotion recognition.
Participants and Methods: In this study, patients who suffered from four types of serious neurological disorders were included. Included were: patients with moderate-severe TBI (N = 118; age M = 38.0, SD = 13.7), patients with aneurysmal SAH (N = 121, age M = 54.0, SD = 10.8), patients with frontally located LLG's (N = 65, age M = 43.4, SD = 11.6), and patients with advanced PD who were eligible for Deep Brain Stimulation (N = 146 age M = 61.2, SD = 7.1). Emotion recognition was measured with the The Facial Expression of Emotion-Stimuli and Test (FEEST) in which patients' ability of recognizing 60 pictures of faces with emotional expressions representing the six basic emotions; (ten of each) was tested. FEEST scores were compared to normative data (median) by means of a One-Sample Wilcoxon Signed Rank Test. Patient groups were compared on emotion recognition by Independent-Samples Kruskal-Wallis Tests.
Results: Results showed that each patient group scored significantly lower compared to the normative group: all groups ($p < .05$). On overall emotion recognition, we found that the TBI group scored lower than the SAH group ($p < .05$) and the PD group ($p < .05$). Furthermore, we found that these neurological disorders significantly differ in recognizing individual emotions. Patients with TBI scored significantly lower on recognizing anger than patients with PD ($p < .05$), and significantly lower on recognizing fear compared to patients with PD ($p < .05$) and SAH ($p < .05$). Finally, the TBI group scored significantly lower on recognizing happiness than the PD group ($p < .05$) and significantly lower on recognizing sadness compared to patients with SAH ($p < .05$). The LLG group did not score significantly different from any group.
Conclusions: This study showed that impaired emotion recognition is present in various neurological patient groups and is, indeed, disorder-transcending. However, there are differences in severity and pattern of impaired emotion recognition between neurological disorders. These differences are important to take into account in clinical practice. In this way, patient care and neuropsychological treatments can be more personalized and adapted to patients' impairments and needs, having a positive influence on treatment outcome.

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19 Is There a Direct Link Between Social Disinhibition and Aggression After Severe TBI?

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Objectives: Aggression and social disinhibition are pervasive outcomes following a traumatic brain injury (TBI). Both have similar prevalence rates and are linked to pathology of the frontal lobes. Despite these similarities, research regarding social disinhibition is limited and treatment programs are lacking. Establishing a direct relationship between social disinhibition and aggression would facilitate better conceptualisation of this construct. This would add significantly to understanding associated behaviours and potentially open up treatment opportunities by applying interventions directed for aggression should the two prove to be related. The current study aimed to test whether there is a direct link between social disinhibition and aggression in a sample of people with severe TBI.
Participants and Methods: Twenty-five individuals with severe TBI were matched to a group of 25 healthy control participants on their age, sex and education. Collected data included the Buss-Perry Aggression Questionnaire (BPAQ), Frontal Systems Behavior Scale - Disinhibition (FrSBe-D), and an observational measure of social disinhibition (Social Disinhibition Interview - SDI). Participants also completed a demographic questionnaire and the Depression, Anxiety and Stress Scale (DASS-21) to measure psychological distress. Correlation analyses were performed between measures of aggression and social disinhibition. Next, the aggression domains significantly associated with social disinhibition in the correlation analysis were used in subsequent hierarchical linear regression analyses, in order to determine whether these could explain FrSBe-D and SDI scores.
Results: A moderate positive correlation was found in the TBI group between BPAQ Anger and SDI score, as well as between BPAQ Anger and FrSBe-D. In the control group, there was a large positive correlation between BPAQ

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Physical and FrSBe-D, BPAQ Anger and FrSBe-D, and between BPAQ Total and FrSBe-D score (all p <.05). Hierarchical multiple regression analyses revealed that, when controlling for participants' group, age at testing and current mood, the inclusion of BPAQ Anger in the model led to a 13% increase in proportion of explained variance (Adjusted R^2 increased from .243 to .363, p<.005). Increase in Anger by 1 standard deviation was associated with an increase in FrSBe-D by 0.4 standard deviations. BPAQ Anger, however, was not a significant predictor of SDI scores. Similarly, BPAQ Physical aggression scores did not contribute to the prediction of FrSBe Disinhibition or SDI scores.
Conclusions: The results of this study indicate that, irrelevant of a person's brain injury status, age or current mood, higher levels of self-reported anger (as opposed to other subcomponents of aggression) are linked to higher levels of social disinhibition. This finding has the potential to significantly improve the options for treatment of social disinhibition by implementing successfully trialled anger management techniques. Further research should seek to confirm this hypothesis.

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20 Neuropsychological Impact of COVID-10 on Health Workers: Emotion and Coping Skills

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Objective: The COVID-19 pandemic has generated many consequences in the entire world. It has been studying the direct neuropsychological impact after suffering the infection. But also there are many indirect neuropsychological disorders in people who didn't result affected by COVID- 19, but who worked on the front line, exposing them to important neuropsychological risk factors. The health workers constitute a special vulnerability group to suffer neuropsychological consequences in several areas, such as their emotional regulation, stress, anxiety, depression, burnout and coping skills.
The aim of this study is (1) to describe their emotional regulation, stress, anxiety, depression, burnout, post traumatic stress, social support perceived, and coping skills; (2) To analyze relations between the variables studied (3) To study different profiles of the participants, who shared similar characteristics of the variables analyzed.
Participants and Methods: It was developed a questionnaire with information about sociodemographic variables, emotional regulation, anxiety, depression, stress, post traumatic stress, social support perceived, and coping skills. This tool was distributed in a telematic way. The sample was formed with 275 subjects. All participants were health workers serving during the pandemic of COVID-19 into the sanitary environment of Spain. The questionnaire was applied between May 2021 to July 2021.
Results: Significant statistical relations (p<0.01) were found between coping skills (CS) and psychopathological symptomatology of depression, anxiety and stress (Pearson's r between -0.34 and 0.45) and also between coping skills and dimensions of burnout (Pearson's r between -0.43 and 0.50). In addition, significant relations were found between the emotional regulation strategy (ER) of suppression with symptoms of depression (r=0.28) and Burnout (r=0.28). A cluster analysis was performed using the Ward method (hierarchical clustering), in which 3 groups could be identified. Cluster A was the largest group, with older participants, lower levels of depression, anxiety, stress, and burnout. Regarding CS, active coping, planning, reevaluation and acceptance stand out. And with respect to ER, it presents the highest reassessment mean. Cluster B was the small group, with the highest levels of depression, anxiety, burnout, and stress. Regarding SC, denial, disconnection, drug use and self-incrimination stand out. It presents the highest mean in the ER of suppression of the three groups. Cluster C was the youngest group, with intermediate levels of anxiety, stress, exhaustion, and depression. Regarding CS, self-distraction stands out. The ER presents a higher mean in revaluation.
Conclusions: These findings suggest that the health workers more than one year after the begin the pandemic COVID-19, shows problems in neuropsychological areas, like the emotion. Emotional regulation abilities and the coping skills used are relationated with burnout, anxiety, depression and stress. A high vulnerability group was identified by the cluster

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analysis.The mental health field inside the sanitary environments needs to be attended to prevent and solve psychological disorders and the consequences that could generate on the healthcare system due to prevent sick leaves in the health workers and to insure the quality of the attention received.

21 Sleep impacts academic performance among college students

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Objective: Sleep is an essential part of our daily routine, where we spend approximately one-third of our time doing it (National Institute of Neurological Disorders and Stroke [NINDS], 2019). Depending on the age group, the sleep quality captured can vary from 7 to 14 hours per night (Center for Disease Control and Prevention [CDC], 2017). Prevalence of poor sleep quality ranges from 10-48% within the general population (Hinz et al., 2017; Ohayon & Smirne, 2002; Wong, 2011). Various factors cause insufficient sleep, such as stress, school, or job demands. The quality of sleep obtained every night significantly impacts cognitive functioning. When proper sleep is not acquired, memory and learning are affected. The effect of sleep may result in the inability to consolidate information properly. Specifically, sleep deprivation results in memory deficiencies in college students, such as forgetting information learned in the day (Blissitt et al. 2001). College students show a stronger association between poor sleep and memory, such impacts academic performance (Vedda et al., 2019). Results indicated that insufficient sleep affects cognition such as alertness, working memory, executive functioning, and sustained attention, which impacts academic performance. (Vedda et al., 2019). The US Latino population is currently one of the fastest-growing populations, with approximately 57 million Latinos in the US which is 18% of the nation's population (Krosgstad & Noe-Bustamante, 2021). Thus, this study aims to understand the Latino population. It is hypothesized that Latino undergraduate students that report poor sleep will demonstrate a low GPA. A Pearson's correlation analysis will be conducted to determine whether there is a relationship between poor sleep and academic performance (GPA).
Participants and Methods: Undergraduate Latino students will be utilized in this study to determine whether poor sleep impacts academic performance (GPA). Must be Undergraduate Latino students enrolled in college and currently working. Eighteen years and above, read and understand English, and be a current resident of the United States. These items are listed in the consent form and asked in the demographics section. All individuals who meet inclusion criteria have the opportunity to participate. Individuals will be self-selected from a wide net across several social media sites such asReddit, Instagram, Twitter, and Facebook. Two questionnaires will be completed: demographics questions and Pittsburgh Sleep Quality Index (PSIQ).
Results: Previous research indicates that undergraduate Latinos who attend school obtain a slightly lower GPA given life stressors (Reuter & Forster, 2020). We predict undergraduate Latinos that report poor sleep will demonstrate a low GPA.
Conclusions: Previous research indicates that undergraduate Latinos who attend school obtain a slightly lower GPA than Causation and Asian American origin (Reuter & Forster, 2020).The results of this study will show that show a statistically significant relationship between poor sleep hours and academic performance among Latino undergraduate students. The following factors might further explain the results: type of major, social pressure, and type of work (heavy work vs. low impact work).

22 Attention Deficiencies in Children with Developmental Dyslexia

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Objective: Developmental Dyslexia (DD) is still on debate. There is a consensus that is based on neurobiological factors and is considered rather as multi deficit because no single theory could adequately describe the diversity of its phenotype. The present study aimed to explore further the question of the relation between attention deficit and dyslexia using two different behavioral approaches.
Participants and Methods: The present study involved two groups of 13, Greek speaking children from 5th, 6th grade of elementary school and from first grade of Junior High School. The first group consisted from children who were diagnosed with DD and the second group consisted from typically developing children who were paired matched for age and gender with the dyslexic group. Attention was investigated through two different types of tests.

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At first, attention was investigated through the "Test of Detection and Investigation of Attention and Concentration", which has been standardized in 1.011 Greek students, across the country. The test consisted of four subscales: a) sustained auditory attention, b) sustained visual attention, c) range of auditory attention, d) range of visual attention. Finally, a Total Attention Score was produced. Secondly attention was investigated through five different dichotic listening tasks, in free recall mode. Dichotic listening tests (DLT) consisted of a) a dichotic digit task (DDT), b) a dichotic word task (DWT), c) a dichotic consonant – vowel (DCV) syllables task, d) a dichotic task with musical instruments (DMI), e) a dichotic task with tones (DTN). DLT were conducted through Force Left (FL) and Force Right (FR) recall mode. **Results:** Children with DD presented lower attention score in all subtests of "Test of Detection and Investigation of Attention and Concentration" as well in the Total Attention Score of the test compared to control group. Results were statistically significant for The Total Attention Score and all subtests, with a solely exception the sustained visual attention task. Similarly, children with DD showed lower attention scores in all dichotic tasks, both in forced left or forced right recall mode. However, statistical significance was not reached for every task. In the Force Right (FR) recall mode statistically significance reached for DDT, DCV and DTN tasks. In the Force Left (FL) mode the two groups differed significantly in the DWT, DMI and DTN tasks. **Conclusions:** Using two orthogonal independent methodologies in the current study we investigated attention in children with dyslexia with. Our results provide evidence that children with DD have greater deficits in attention compared to their peers of typical development. These findings are in line with recent studies, underlining the crucial role of attention in DD. Such findings may have interesting educational implications for the practitioners as it is important to redesign their interventions to consider possible attention deficits of dyslexic students.

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23 Academically successful adults with dyslexia: Support for the cognitive compensatory hypothesis

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Objective: Reading is a vital skill for academic and professional success in today's world. However, 3–12% of individuals have difficulties reading due to developmental dyslexia (Katusic et al., 2001). Dyslexia is a long-term reading difficulty that persists into adulthood and is characterized by poor word decoding, low levels of reading fluency, and poor spelling ability (American Psychiatric Association, 2013). Most studies of adults with dyslexia have focused on university students with dyslexia who completed a degree despite poor phonological and reading skills. However, it is unclear how they were able to cope with the intensive exposure to the written language required to achieve such a degree. In line with the compensatory hypothesis (Nicolson and Fawcett, 1990), we suggest that university students with dyslexia may be able to compensate for their reading difficulties by relying on their intact cognitive abilities. To our knowledge, there have been very few studies exploring the cognitive profile of university students with dyslexia, and we have not found any research that explores it from a compensatory perspective. In this study, we examined the cognitive profile of English-speaking adults with dyslexia in the U.S., their cognitive performance, and the relationship between their cognitive abilities and reading skills. To achieve this goal, first, we will examine three basic reading abilities: reading, writing, and phonological awareness. Second, we will test the performance of university students with dyslexia and students without dyslexia on a number of cognitive tasks in order to build a cognitive profile (strengths and weaknesses) for the former group. **Participants and Methods:** A total of 30 university native English-speaking students, 15 with dyslexia, and 15 normal readers will take part in this study. These groups will be matched by age, gender, and educational level, as well as on nonverbal IQ scores as measured by an adaptation of the Raven Matrices. To assess reading abilities, we will use the York Adult Assessment-Revised (YAA-R). To explore their cognitive profile, we will use the EMBRACED computerized battery. We will provide descriptives (mean, standard deviation, range, etc.) for both groups. One-way ANOVA will be used to analyze differences between the two groups on the cognitive tests and reading

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abilities. Correlation and regression analyses will investigate the presence of direct predicting relationships between the cognitive abilities and the reading abilities for both groups.
Results: Based on previous studies (Beidas et al. 2013; Felton 1990), we expect to find that students with dyslexia have better executive functions than normal readers. However, these students will perform below average in attention, memory, language, and visuospatial abilities, and possibly in social cognition. We also expect to find significant correlations between executive functions and reading comprehension in these students.
Conclusions: University students with dyslexia may develop a compensation mechanism related to executive functions that helps them to cope with the intensive exposure to the written language required to achieve a university degree. Understanding the cognitive profile of these students opens up a new exciting field that will aid improving current interventions.

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24 Identification of Early Neurological Predictors of Learning Disorders: Systematic Review and Meta-Analysis

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Objective: To identify the significant early neurophysiological, neuroanatomical, and neurocognitive predictors of developmental-associated language and learning disabilities (LLDs) in children.
Data Sources**:** We searched three electronic databases (PubMed, Scopus, and WOS) for studies published in English between January 2000 and November 2021.
Participants and Methods: Eighty-four studies were included and covered a range of study designs (Randomized controlled trials (RCT) n =12; non-RCT n=74) involving neurophysiological, neuroanatomical, and neurocognitive predictors of dyslexia, dyscalculia, and dysgraphia among children aged between 3–16-year-old were included. Two reviewers independently assessed full-text articles, one reviewer extracted the data, the second reviewer checked the reliability, then narrative methods of synthesis were used, and for sufficiently similar studies, a meta-analysis of effect size was carried out (using a random-effects meta-analysis model with restricted maximum likelihood method pooled estimate).
Results: An electroencephalogram (EEG) finding revealed dyslexia-related neurophysiological predictors such as altered mismatch response, amplitude, and latency changes in event-related potentials. From functional magnetic resonance imaging (fMRI) results children with dyslexia showed decreased activity in the left parietotemporal, left occipitotemporal areas, left superior temporal gyrus, bilateral middle frontal gyrus, left insula, left inferior temporal gyrus, and left hemisphere prefrontal areas during reading, visual scanning, and listening tasks. Moreover, magnetoencephalography (MEG) revealed increased activity in the right inferior and superior parietal areas during arithmetic tasks in children with dyscalculia. From neurocognitive findings, a combined group of dyslexia and dysgraphia showed deficits in verbal working memory, semantic memory, quantitative reasoning visuospatial reasoning, and phonological processing.
Conclusion: Early predictors of neurodevelopmental associated with learning language disorders LLDs would be helpful as targets for specific prevention and intervention programs to be applied at very young ages, which might have a critical impact clinically.

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25 Interhemispheric and Intrahemispheric RS-FC in Left-Handers with Typical and Atypical Language Lateralization

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Objective: Resting-state fMRI (RS) is a potential alternative to task-based fMRI (TB), that could reflect individual profiles in different cognitive aspects such as language or memory (Parker Jones et al., 2017). Due to its relevance and complexity, the study of the language network is growing increasingly important. However, research has been specially focused on describing typical (left-lateralised language network) population, while atypical (rightward or bilateral language network) subjects have been extendedly excluded from studies. Previous research has suggested that variables such as handedness or musical skills may shape

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RS network's distribution (Villar-Rodríguez et al., 2020). Our objective is to investigate the differences in RS functional connectivity (FC) of key regions of interest (ROIs) within the language network comparing groups with typical and atypical language lateralization.
Participants and Methods: One-hundred and fifty left-handed healthy volunteers (73 males; 70 musicians) underwent both TB and RS. Lateralization index was obtained for each subject based on TB data from the Verb Generation task (Villar-Rodríguez et al., 2020). Forty-one participants were classified as atypical. The sample was divided into four groups according to two different factors: language lateralization and musicianship. Four language ROIs (Broca left -BL-, Broca right -BR- Wernicke left -WL- and Wernicke right -WR), which were extracted from Tomasi & Volkow (2012), were defined as 6-mm radius spheres and used in the FC analysis. RS datasets were processed by means of DPARSFA, then FC ROI-to-ROI analyses (pair correlations between ROIs) were conducted. For between-groups comparisons, two 2x2x2 repeated measures ANOVA of the resulting FC ROI-to-ROI correlations were calculated using SPSS software. As intra-subject factors, interhemispheric FC (BR-BL and WR-WL) and intrahemispheric FC (BR-WR and BL-WL) were defined for each of the ANOVAs. As inter-subject factors, language lateralization and musicianship were selected for the two ANOVAs.
Results: Interhemispheric FCs: The ANOVA yielded a significant main effect for Interhemispheric ($F1, 145)=7.71$; $p=0.006$), with higher correlations in BR-BL (=0.54; *SD*=0.29) than WR-WL (=0.49; *SD*=0.26), that was driven by the significant interaction Interhemispheric*language lateralization ($F(1,145)=8.47$; $p=0.004$), with atypical participants showing higher correlation in BR-BL =0.59, *SD*=0.32 for atypicals; =0.52, *SD*=0.27 for typicals) and typical participants showing higher correlation in WR-WL =0.52, *SD*=0.26 for typicals; =0.40, *SD*=0.24 for atypicals). Intrahemispheric FCs: The main effect for Intrahemispheric was significant ($F(1,145)=6.96$; $p=0.009$), with higher correlation in BL-WL (=0.32; *SD*=0.31) than BR-WR (=0.25; *SD*=0.29). No other main effects nor interactions reached significance.
Conclusions: Our results suggest that RS-FC in the atypical population does not simply mirror that of the typical one. Atypicals showed stronger FC between Broca's areas and lower FC between Wernicke's areas, suggesting greater functional segregation in the temporal cortex and a more functionally integrated organization in the inferior frontal cortex. Musicianship does not seem to modulate these differences.

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26 Intraoperative Neuropsychology

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Objective: Intraoperative Neurophysiological Monitoring (IONM) is known as the set of procedures used to surveil a patient's nervous system (the brain, spinal cord, and nerves) during high-risk neurosurgical, orthopedic, peripheral nerve, and vascular surgeries. Over the past years, IONM has become a new component of the standard of care for many neurological surgeries as its focus is to reduce iatrogenic risk and protect patients' nervous systems. IONM is categorized into two types: 1) techniques to identify imminent damage to the nervous system, and 2) techniques to map the structures of the nervous system.
While IONM is not regulated at the federal level in the US or internationally due to the novel nature of the procedure, at least two private certifications are available in the US: 1) the Certification in Neurophysiological Intraoperative Monitoring by the American Board of Electroencephalographic and Evoked Potential Technologists, and 2) the Diplomate of the American Board of Neurophysiological Monitoring. Additionally, Audiologists (Au.D.) may receive board certification via the American Audiology Board of Intraoperative Monitoring (AABIOM), while Medical Doctors (M.D.) may obtain certification by the American Clinical Neurophysiological Society (ACNS).
Participants and Methods: A literature review was conducted using the databases PsychNet, ProQuest, and Google Scholar. Inclusion criteria consisted of articles published in English between 2011-2021 that examined the use of IONM. Keywords for the search included IONM, intraoperative neurophysiological monitoring, and neuropsychology. A total number of 27 articles were considered, and 7 were retained.
Results: Neuropsychologists (Psy.D./Ph.D.) serve as experts in functional neuroanatomy, the central nervous system, brain-behavior relationships, neurofeedback, and related electrophysiologic technologies. As such, this review aimed to study and subsequently propose the consideration of IONM within an expanded scope of practice of appropriately trained and certified neuropsychologists. Taking audiologists as the sole example of allied health

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doctoral-level professionals certified in IONM, it has been established the requirements to practice and by extension supervise are inclusive of having an unrestricted license to practice in their respective field, having a minimum number of IONM cases across at least three different surgical specialties, and completion of yearly CEUs to remain board certified. Upon examination of the available literature, data strongly supports the growth of IONM as a prominent addition to the surgical team.

Conclusion: Consistent with the expertise needed to practice IONM, the studies reviewed suggest that specialized professionals, specifically master to doctoral-level practitioners with electrophysiologic and applied neuroscientific backgrounds and proficiencies, qualify for IONM certification. There is a need for consensus for the creation of a certification in IONM for neuropsychologists. Such certification could be developed and regulated by a recognized neuropsychological organization. Moreover, fundamental to the doctoral-level practice of IONM is working to safeguard the integrity of the surgical process via the direct or indirect supervision of master-level technologists in a comparable capacity to the relationship between an anesthesiologist and a nurse anesthetist. The clinical neuropsychologist can interpret neurophysiologic data gathered via the neuromonitoring procedure to complete post-surgical interpretive reports, provide expert opinion, collaborate in treatment planning, and other relevant tasks permitted at the individual competency and regulatory level.

27 Transcranial Electrical Stimulation Techniques Comparison on Foreign Language Learning: a Pilot Study

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Transcranial electrical stimulation techniques (tES) have been widely used in the past few years for the enhancement of different cognitive domains such as language. Previous studies suggest that the use of tES on healthy volunteers is related to spoken language learning facilitation. However, the study of the effects of tES on foreign language learning processes is scarce and it remains unclear which stimulation technique could be most suitable for this purpose. Thus, the main objective of this study was to analyse whether tES enhances foreign language learning processes. Additionally, we analysed which stimulation montage would be most effective for learning enhancement, as well as explored whether relevant variables in language acquisition, such as the participant's age or years of education, would influence the effects of stimulation. To this end, a double-blind controlled study was carried out. Sixty-seven healthy native Spanish speakers, aged 18-58 years old, were randomly assigned to three stimulation groups (transcranial direct current, transcranial random noise and mixed stimulation) and a placebo-control group. All participants completed two intervention sessions with a two-week gap in between. In the first session, participants received 20 minutes of stimulation while learning new English words and then performed recall and recognition tasks. In the second session, they were tested again without stimulation. The results showed no differences in learning between groups on the first experimental session (F=1.8; p= .15), however, two weeks later, a better learning accuracy was shown by the volunteers that received stimulation compared to the placebo-control group (F=3.5; p =.02). Besides, the participants who received tRNS remembered more words compared to the other montages and showed better performance than the mixed stimulation group (p =.04). These results suggest that tES (especially tRNS) favours foreign language vocabulary learning processes, strengthening its maintenance. However, further research is needed.

28 Use of Transcranial Direct Current Stimulation in the Rehabilitation of Hemineglect in Stroke: A case Report.

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Objective: The study aimed 1) to demonstrate that non-invasive neuromodulation using tDCS enhances the results of conventional neuropsychological rehabilitation, 2) to identify prognostic markers of response to therapy by means of electroencephalogram, and 3) to determine the clinical and neurophysiological variables of patients that are the best predictors of the efficacy of a combined treatment, including neuromodulation in combination with conventional intervention.
Participants and Methods: A single-case, triple-blind study was conducted. A 49-year-old woman, right-handed, with a stroke located in the right middle cerebral artery. The time elapsed since the injury was 5 months. A pre- and post-intervention assessment was performed by using a set of neuropsychological tests aimed at assessing hemispatial neglect and other attentional abilities. The functional impact on activities of daily living was also assessed. The intervention consisted of a two-week intervention (10 sessions, 45 min, Monday to Friday) of tDCS and neuropsychological rehabilitation applied concurrently through the neuro-rehabilitation web platform (NeuronUp) for 30 minutes. In each session, a 20 min tDCS, with 2 mA of intensity, was applied over P3 (cathodal) with return electrodes placed in C3, CP5, CP1, Pz, PO3, PO7, P7. StarStim tDCS 8 channels multisite device was used.
Results: Significant improvements were observed in the tests evaluating neglect syndrome (The Bells test, The Star cancellation test, and The motor-free visual perception test (MVPT), as well as in other attentional tests (The Brief Test of Attention and digits backward). Improvements were also observed in the functional questionnaires, i.e. The Barthel Index and The Catherine Bergego Scale. On the other hand, no improvements were observed in the line bisection task, in the picture copying task, or The Faces Test.
Conclusions: tDCS is a safe and non-invasive technique with sufficient scientific literature that supports its effectiveness and safety, in different neurological pathologies. The innovative nature of this study is the application of the tDCS in combination with a computerized cognitive rehabilitation in one of the most disabling cognitive alterations, such as hemispatial neglect. Further studies are needed to support the efficacy of tDCS in the treatment of neglect, but tDCS seems to be an effective therapeutic approach in neglect syndrome when combined with other more conventional interventions. Although research for considering tDCS as a therapeutic tool has shown promising results, scientific evidence is still scarce. Further controlled, blinded research with large clinical samples remains essential to know the real tDCS potential. The integration of neuromodulation into the neuropsychological rehabilitation processes could shorten intervention times and improve the final functional status of patients.

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29 No association between TEED and verbal fluencies after DBS in patients with Parkinson's disease

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Objective: We aimed to evaluate the role of total electrical energy delivered (TEED) after Subthalamic Nucleus Deep Brain Stimulation (STN-DBS) on verbal fluency in Parkinson's patients (PD)
Participants and Methods: 21 patients with PD (10 female, age (mean ± SD) 59 ± 7.07 years) undergoing bilateral STN-DBS were enrolled in the study. We assessed Phonemic [1]

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and Semantic Verbal Fluencies test [2] before (T0), 6 months (T1) and 12 months (T2) after surgery. Stimulation parameters were recorded in order to estimate the TEED to the STN.
Results: One-way repeated measures ANOVA revealed a significant main effect of 'Time' on phonemic fluency ($F[2,40] = 10.39$; $P < 0.001$; $\eta 2 = 0.34$) and semantic fluency ($F[2,40] = 11.21$; $P < 0.001$; $\eta 2 = 0.33$). Post-hoc tests showed a significant worsening of phonemic and semantic verbal fluency at T1 (Fonemic T0 vs T1: mean ± SD = 42.38 ± 10.85 vs. 36.33 ± 10.80; $P = 0.001$; Semantic: 48.14 ± 8.36 vs. 40.86 ± 9.41; $P < 0.001$). No significant differences were found between T1 and T2 (phonemic fluency: $P = 0.595$; semantic fluency: $P = 1.000$). Semantic fluency and phonemic fluency did not correlate with TEED Left (all $P > 0.285$), TEED Right (all $P > 0.256$), or TEED Laterality (all $P > 0.111$).
Conclusions: Although being a promising treatment approach for advanced PD, our findings suggest that STN-DBS can induce side effects such as language impairments. However, we did not find significant correlations between TEED and verbal fluencies. Interestingly, our results show that the performance decreased significantly at T1, but then leveled off at T2, indicating a stable clinical condition after 12 months from the implantation. Many factors such as pre-surgical neuropsychological patients' characteristics, surgical trauma, and patients' recovery from implantation could lead to different neuropsychological outcomes after STN-DBS implantation.
References: [1] Carlesimo GA, Caltagirone C, Gainotti G, and the group for the standardization of the mental deterioration battery (1996) The Mental deterioration battery: normative data, diagnostic reliability and qualitative analyses of cognitive impairment. Eur Neurol 36:378–384. [2] Costa, A., Bagoj, E., Monaco, M., Zabberoni, S., De Rosa, S., Papantonio, A. M., ... & Carlesimo, G. A. (2014). Standardization and normative data obtained in the Italian population for a new verbal fluency instrument, the phonemic/semantic alternate fluency test. Neurological Sciences, 35(3), 365-372.

30 Neural basis of visuospatial tests in behavioral variant frontotemporal dementia

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Objective: Recent models of visuospatial functioning suggest the existence of three main circuits emerging from the dorsal ("where") route: parieto-prefrontal pathway, parieto-premotor, and parieto-medial temporal. Neural underpinnings of visuospatial task performance and the sparing of visuospatial functioning in bvFTD are unclear. Our aim was to describe the neural correlates of visuospatial abilities in bvFTD patients and compare them with AD patients. To this end, we examined a large cohort of patients with bvFTD and AD that underwent cognitive assessment and FDG-PET imaging.
Participants and Methods: Two hundred and sixteen participants were enrolled for this study: 72 patients with bvFTD dementia and 144 patients with AD. Visual Object and Space Perception Battery Position Discrimination and Number Location (VOSP-PD and VOSP-NL) and Rey-Osterrieth Complex Figure (ROCF) were administered to examine visuospatial functioning, together with a comprehensive neuropsychological battery. FDG-PET was acquired to evaluate brain metabolism. Voxel-based brain mapping analyses were conducted to evaluate the brain regions associated with visuospatial function in bvFTD and AD. For intergroup differences, Student's t and ANCOVA were calculated. Eta squared was calculated for the measurement of effect size. Chi-squared test was calculated for categorical variables. Correlation coefficients of Pearson and determination coefficients were calculated. Fisher's r-to-Z transformation was used to compare correlation coefficients.
Results: Attention and executive functioning tests showed higher correlations in bvFTD than AD with ROCF, but not VOSP subtests. Visuospatial performance in patients with bvFTD was associated with bilateral frontal regions, including the superior and medial frontal gyri, supplementary motor area, insula and middle cingulate gyrus.
Conclusion: These findings support the role of prefrontal and premotor regions in visuospatial processing through the connection with the posterior parietal cortex and other posterior cortical regions. Visuospatial deficits should be interpreted with caution in patients with bvFTD, and should not be regarded as hallmarks of posterior cortical dysfunction.

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31 Aphantasia: Case Report

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Objective: Aphantasia happens when the brain's visual cortex doesn't work properly. From the field of Neuropsychology it is not clear what are the causes of aphantasia. Most people with this condition are born with it and are otherwise healthy, and some others develop it after a brain injury. In this case report we present the cognitive profile of a 24 years old male with aphantasia.
Participants and Methods: We present the neuropsychological examination of a Spanish 24-year-old man. At the time of his exploration he was studying for a college degree. The cognitive examination was performed in two 90-minute sessions and the following tests were administered: WAIS-III, FCR, TMTA&B, AVLT, RVLT, and VVIQ.
Results: The results showed cognitive normality in all the the explored domains, with a better performance in verbal tests than in visual ones. On the other hand, an inability to imagine was observed through the VVIQ.
Conclusions: Although the inability to imagine is not a clinical condition in itself, it can create difficulties in the academic or professional career. Being able to identify this condition and provide psychoeducation may help to improve the lives from people who suffer this condition.

32 Improving Creativity with Combined Transcranial Direct Current (tDCS) and Random Noise (tRNS) Stimulation

Javier Peña[1] , Agurne Sampedro[1] , Oihana Zabala[1] , Naroa Ibarretxe-Bilbao[1] , Acebo García[1] , Leire Zubiaurre-Elorza[1] , Natalia Ojeda[1]

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Objective: Creativity is a fundamental human accomplishment from scientific advances to composing music. The left dorsolateral prefrontal cortex (DLPFC) and inferior frontal gyrus (IFG) are important metacontrol hubs in flexibility and persistence brain states, respectively. Applying tDCS with the cathode over the left IFG increases divergent thinking (DT) and insight problem solving; while anode over the left DLPFC increases convergent thinking (CT). The aim of the study was to determine the effects of a combined tDCS-tRNS protocol with the anode on the left DLPFC and cathode on the left IFG on creativity sub-components.
Participants and Methods: In this double-blind, between-subjects study, 81 healthy participants were randomly assigned to one of three groups (n=27) that received a combined tDCS-tRNS protocol with the anode over the left DLPFC and cathode over the left IFG (+F3-FT7), the opposite montage (-F3+FT7) and a sham group (+F3-FT7). Both active tDCS-tRNS groups received 20 minutes of 1mA tDCS with 1mA (100–500Hz) tRNS. Creativity was assessed before (baseline) and during stimulation with the Unusual Uses (UU), Picture Completion (PC), Remote Association test (RAT), Matchstick Arithmetic (MA) and Nine-dot (ND) problems.
Results: Only the +F3-FT7 group had significantly higher scores compared to sham in the RAT (p=0.009,=0.12,BF_{10}=5.15), PC fluency (p=0.018,=0.10,BF_{10}=2.86), PC originality (p=0.007,=0.12,BF_{10}=6.89), ND (p=0.007,BF_{10}=15.65) and MA (p=0.032,BF_{10}=4.49). Overall the -F3+FT7 group had greater scores in all creativity tests compared to sham.
Conclusions: The greater directionality effects of the +F3-FT7 group on creativity sub-components suggests a more efficient use of switching ability between flexibility and persistence brain states.

33 Creativity and transcranial non-invasive stimulation with transcranial random noise stimulation

Oihana Zabala-Gómez[1] , Agurne Sampedro[1] , Natalia Ojeda[1] , Naroa Ibarretxe-Bilbao[1] , Olaia Lucas-Jiménez[1] , Javier Peña[1]

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Objective: Creativity has become a cutting-edge area of neuroscience. Several studies have found that transcranial stimulation can improve

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creativity. Two brain areas have been involved mainly, dorsolateral prefrontal cortex (DLPFC) and inferior frontal gyrus (IFG). The aim of this study was to explore the effect of stimulation after 24 hours, joining both montages tDCS and tRNS.

Participants and Methods: Twenty-four participants were recruited and separated double blinded into two groups depending on whether they received stimulation (experimental, n=12) or not (sham, n= 12). The procedure was carried out in two days. Remote Associates Test (RAT) was used to measure convergent thinking improvement and Picture Completion (figurative) and Unusual Uses (UU) task from TTCT (Torrance Test of Creative Thinking) were employed to search upon divergent thinking. Both (RAT and TTCT) were assessed before and 24 hours after stimulation, which was performed through anodal over the left DLPFC and cathodal stimulation on the left IFG. Student's *t* has been used for age and handedness, while for gender, sleep hour, stimulants, and adverse effects Chi Square (X2) was used. Change scores (after 24 hours minus baseline) were compared with ANCOVA (baseline scores as covariates) both groups' performance for RAT, fluency, and flexibility of Figurative and UU scores. On the other hand, originality was analyzed with Mann-Whitney's *U*. Significance level of 0.05 was set for all the statistical analysis and contrasted with two-tailed tests.

Results: Scores after stimulation in RAT did not show significant difference between both groups [F (1,22) = 0.756, $p = 0.394$]. In the case of divergent thinking, experimental group showed a little but not statistically significant difference in fluency compared to sham group [F (1,22) = 1.054, $p = 0.316$]. In contrast, in figurative flexibility, sham group demonstrated little higher score than experimental group considering baseline score although the difference was not statistically significant [F (1,22) = 0.025, $p = 0.876$]. Scores for originality showed no significant differences between the two groups [U = 67, $p = 0.767$]. There were not statistically significant differences between the two groups in UU fluency [F (1,22) = 0.123, $p = 0.729$]. In UU flexibility participants in the experimental group seem that they got a slight change, however, this difference with the sham group is not statistically significant [F (1,22) = 0.280, $p = 0.602$]. Regarding originality in UU, scores did not lead to any statistically significant difference either (U = 50.5, $p = 0.211$).

Conclusion: The main aim of the study was to measure any effect of stimulation after 24 hours, but it was not achieved. Nonetheless, in most of the cases scores were slightly higher in experimental (tRNS+tDCS) than the sham (no stimulation) group. On top of that, it has also been demonstrated that creativity process is fulfilled by the interaction of different brain areas, such as DLPFC and IFG. All in all, more in-depth study is needed in this area of neuroscience.

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34 Changes in Brain Activation after Functional Neurosurgery in Refractory OCD

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Objective: Obsessive-Compulsive Disorder (OCD) is a disabling psychiatric disorder. Neurobiological model of OCD proposed that an imbalance between an orbitofrontal-striatal direct excitatory pathway and an indirect inhibitory pathway would mediate symptomatic expression of OCD. Abnormalities of brain function within a dorsolateral-prefrontal striatal circuit have also been described, possibly accounting for neuropsychological impairment. Functional magnetic resonance imaging (fMRI) studies after pharmacotherapy or behavioural therapy have shown decreases and increases in the activity of different brain regions within these networks, during individuals' performance of cognitive tasks. In addition, neurosurgery studies using PET at resting have shown decreased metabolic activity in orbitofrontal-striatal circuit including the anterior cingulate gyrus, orbitofrontal cortex, caudate nucleus and medial dorsal thalamus. To date no studies have used fMRI during cognitive task performance to evaluate brain activation changes after functional neurosurgery. Describing such

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changes could became central for understanding the differential role of distinct brain areas in the clinical and neuropsychological correlates of OCD. Therefore, the aim of this study was to describe changes in the pattern of fMRI brain activity during performance of cognitive tasks in order to assess the predictions of current neurobiological models in OCD.
Participants and Methods: Ten OCD refractory patients underwent neurosurgery (including capsulotomies and cingulotomies) by radiofrequency or Gamma Knife radiosurgery. Brain activation changes were registered with a 3.0T magnetic resonance imaging in seven of them. Three cognitive tasks (Stroop, Go No Go and 2-Back) were considered for the recording of brain activity.
Results: A significant improvement in clinical scores (OCD symptoms severity, anxiety, and depression) was observed. A decrease in brain activation during tasks performance after surgery was observed within areas of the orbitofrontal-striatal direct and indirect pathways. Specifically, within the orbitofrontal cortex, anterior cingulate cortex, putamen, lateral pallidum and thalamus. In contrast, an increase in brain activation during tasks performance emerged in the medial frontal gyrus.
Conclusions: analysis of functional MRI activation during performance of experimental tasks revealed brain activation changes in both the orbitofrontal-striatal and dorsolateral prefrontal-striatal networks described in current neurobiological models of OCD. The results are compatible with the notion that successful OCD treatment involve decreased brain activity in the orbitofrontal-striatal pathway. Moreover, our results revealed increased activation in brain areas associated to a dorsolateral-prefrontal striatal circuit, associated to a decrease in the 'noise signals' from the orbitofrontal-striatal pathway. The association between changes in brain activity and changes in clinical and neuropsychological symptoms are discussed.

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35 White matter Correlates of Executive Functions: a neuropsychological study using Diffusion Tensor Imaging.

Manuela Martín-Bejarano[1,2] , Jose Antonio Periañez[3] , Genny Lubrini[3] , Blanca Navarro-Main[4] , Garazi Laseca-Zaballa[3] , Juan Álvarez-Linera[5] , Marcos Ríos-Lago[6,7]

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Objective: There is evidence regarding the multidimensional nature of executive functions (EF). Most studies so far have interrogated brain anatomy and EF components relationships from functional or structural techniques, leaving the nature of these relationships in white matter (WM) widely unexplored. The aim of the present study was twofold. Firstly, to explore whether cognitive processes underlying classical neuropsychological tests performance fit the multidimensional EF structure proposed in the literature. Secondly, to study the existence of anatomical dissociation between WM tracts associated with the EF components.
Participants and Methods: This cross-sectional study included 13 subjects with a history of closed head injury (mean age 25.88±10.04 years; mean education 11.61±3.40 years; 3 females) and 12 healthy controls (mean age 29.5±2.2 years; mean education 15.25±2.52 years; 7 females). All the participants completed four classical neuropsychological tests (Stroop, Trail Making Test, Wisconsin Card Sorting Test, Digit Backwards) considering EF, and underwent MRI scans. Principal Component Analysis (PCA) was performed to describe the EF multidimensional structure. DTI Studio and SPM12 analysis was used to identify WM tracts significantly associated with each EF component.
Results: PCA analysis identified four different EF factors, accounting for 93.8% of the variance. TMT B–A and digits backwards loaded on the first factor *(working memory)*; WCST scores, total errors and perseverative errors, loaded on the second factor (*flexibility*); Stroop C and TMT A define the third factor (*Information Processing Speed*), and the fourth factor (*conflict monitoring*) is loaded by Stroop CW and Stroop Interference scores. Results from voxel-based analysis show statistically significant voxels where FA values correlate with the neuropsychological scores within each factor. On the other hand, common regions within each factor are also found.
Conclusions: The result of the present study supports the multidimensional nature of EF

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according to previous literature. A unique pattern of association between each EF factor and white matter tracts was found. Findings suggest that the working memory, flexibility, and conflict monitoring factors correlated with smaller and external areas of the white matter structure. However, information processing speed was observed in wider and inner areas corresponding to longer tracts of white matter all over the brain. This line of research has the potential to contribute to the multidimensional of EF theoretical framework.
Keywords: White matter, executive functions, DTI, information processing speed

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36 Testing the RST Factorial Structure on a Voxel-Based Morphometry Dataset: A Confirmatory Factorial Analysis

Elena Lacomba-Arnau[1] , Agustín Martínez-Molina[3] , Jorge Moya-Higueras[1] , Alfonso Barrós-Loscertales[2]

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[2]Jaume I University
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Objective: MRI research has evidenced the existence of structural covariance patterns between brain regions. Confirmatory Factor Analysis (CFA) is generally used as a deductive approach to testing whether some a priori formulated theoretical model adequately explains covariances among observed variables. According to the Reinforcement Sensitivity Theory (RST), the striatum nuclei are involved in BAS and the limbic system in FFFS/BIS.
Participants and Methods: In this study, we investigated whether there are structural covariance patterns that group the brain structures described by RST. We applied a CFA on a a a Voxel-Based Morphometry (VBM) dataset in a wide-sample of 300 healthy volunteers. To implement a whole-brain perspective that defines regions according to a priori properties, Neuromorphometrics Atlas volume parcellation algorithm was used. Following the Schreiber, Stage, King, Nora, and Barlow (2005) recommendations, RMSA, CFI and TLI were used as indicative of a good fit.
Results: The results evidenced a good model fit (RMSEA 0.033; CFI 0.957; TLI 0.941) with two independent factors generally composed by 1) the amygdala, hippocampus and posterior cingulate cortex, and (2) the accumbens, caudate and putamen nuclei.
Conclusion: In conclusion, the results are in line with the proposal of the RST. Possible applications of the BAS model will be discussed. However, more research is required with this methodology.

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37 Language Perception in Schizophrenia: a Neuroimaging Study

Lucila Barbosa[1] , Joan Soler-Vidal[1,3,4] , María Ángeles García-León[1,2] , Paola Fuentes-Claramonte[1,2] , Pilar Salgado-Pineda[1,2] , Nuria Ramiro[5] , María Llanos Torres[6] , Antonio Arévalo[7] , Amalia Guerrero-Pedraza[4] , Ana Aquino[1,3] , Sandra Fernández-Núñez[4] , Josep Munuera[8] , Salvador Sarró[1,2] , Raymond Salvador[1,2] , Wolfram Hinzen[9,10] , Peter McKenna[1,2] , Edith Pomarol-Clotet[1,2]

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Objective: An influential theory of auditory verbal hallucinations (AVH) in schizophrenia proposes that their underlying mechanism involves aberrant activity in the auditory sensory cortex. If so, when AVH are very frequent, an effect on activation in response to real speech sounds might be expected, for example reduced activation because of competition with AVH. Previous neuroimaging studies have found evidence for such reduced activation in the left superior temporal gyrus and auditory association cortex during real speech perception in frequently hallucinating patients; however, these studies featured small sample sizes or did not compare patients with AVH to those without AVH, only to healthy controls.
Participants and Methods: Forty-six patients meeting DSM-5 criteria for schizophrenia were selected based on either experiencing very frequent hallucinations (AVH+, N=23) or being hallucination-free (AVH-, N=23). Twenty-five matched healthy individuals were also examined. Participants underwent fMRI while performing an auditory speech perception task in which spoken words and spoken sentences

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were presented through headphones. These were contrasted against a control condition consisting of spoken unintelligible reversed speech. Whole brain voxel-based analysis compared the patient and control groups, and the two patient subgroups (AVH+ vs. AVH), in each contrast of interest (*words* > *reversed* and *sentences* > *reversed*). All statistical tests were carried out at $p<0.05$ corrected at the cluster level using Gaussian random field methods, with a cluster-forming threshold of $z>3.1$.
Results: No differences between AVH+ and AVH- were found in any of the contrasts. For the *words* > *reversed* contrast, activation maps were similar for patients and healthy controls and involved the left precentral and middle temporal cortex. In the *sentences* > *reversed* contrast, however, the patients hyperactivated left lateral middle and inferior frontal gyrus as well as left inferior and superior parietal cortex compared to the healthy controls. There was also bilateral hyperactivation in the middle cingulate cortex and precuneus.
Conclusions: The findings provide no support for the aberrant auditory cortex activity hypothesis of AVH in schizophrenia. In schizophrenia as a whole, we found evidence of hyperactivation in frontal and temporal regions in the *sentences* > *reversed* contrast. This might suggest a general alteration of language perception in schizophrenia at the level of sentence processing.

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38 Defining and Characterizing GWI Pathology using Longitudinal Brain Imaging Biomarkers

Jenna Groh[1] , Chia-Hsin Cheng[1] , Bang-bon Koo[1] , Ronald Killiany[1] , Maxine Krengel[1] , Kimberly Sullivan[2]

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Objective: Veterans of the 1991 Gulf War (GW) continue to experience chronic symptoms of Gulf War Illness (GWI) which includes fatigue, memory and concentration problems, muscle and joint pain and headaches. Brain white matter (WM) alterations have been shown to be present in veterans with GWI in several different studies suggesting a pathobiological link to the disorder. It has now been 30 years since the war and as veterans age, questions have arisen whether these brain changes are worsening or remaining static over time. The objective of this study is to assess if longitudinal brain volumetric changes are present in veterans with GWI. We hypothesized that veterans with GWI would have longitudinal patterns of decreased brain volumetrics and white matter structural integrity.
Participants and Methods: Study participants included 25 Gulf War veterans who met criteria for GWI based on the Kansas GWI definition. Each participant had MRI brain imaging performed at two time points on average five years apart on a Philips 3T scanner. The mean current age for participants was 56.5 years and included 28% women. For this study, longitudinal Time 1 and Time 2 MPRAGE MRI scans were compared. Cortical reconstruction and volumetric segmentation were performed with Freesurfer 6.0, which is documented and freely available for download. Paired t-tests were performed to evaluate changes in brain volumetrics over time within the same individuals.
Results: Veterans with GWI showed decreased hippocampal volume in the left ($p=0.001$) and right hemispheres ($p=0.001$) from Time 1 to Time 2. White matter pathways were also changed over time. In particular, the corpus callosum decreased across all segmented regions including the anterior region ($p=0.013$), mid-anterior region ($p=0.017$), central region ($p= 0.010$), mid-posterior region ($p= 0.002$), and the posterior region ($p=0.009$) from Time 1 to Time 2.
Conclusions: As hypothesized, individuals with GWI showed decreased volumetrics in key structures and white matter pathways over time. These white matter changes appear to be progressing as veterans' age. We have also noted cognitive changes in memory, attention and processing speed that may correlate with these brain volumetric changes. More research is needed in a larger study sample to confirm these preliminary longitudinal

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brain imaging results and to compare with cognitive outcomes.

Plenary Keynote: Spatial Neglect and the Vestibular System

Presenter: Hans-Otto Karnath

12:00-13:00h
Friday, July 8, 2022

Lunch Break

13:00-14:00h
Friday, July 8, 2022

Symposium 12: The contribution of somatosensory deficits to different clinical phenomena
Sponsored by the Federation of European Societies of Neuropsychology, FESN

Chair: Hans-Otto Karnath
Presenters: Chris Dijkerman, Anna Berti, Stephen Jackson

14:00-15:20h
Friday, July 8, 2022

SYMPOSIUM SUMMARY:

The Contribution of Somatosensory Deficits to Different Clinical Phenomena

Edward de Haan[1] & Chris Dijkerman[2]

[1]Psychology department, University of Amsterdam
[2]Psychology department, Utrecht University

The somatosensory system is important for many functions, such as tactile recognition, the perception of our body, and motor actions. Based on a comprehensive review of the human and animal literature on somatosensory processing over the past 10 years and a survey of the brain structures involved in somatosensation, we suggested a new model (de Haan& Dijkerman, 2020, TiCS, p529-541). Two main conclusions were put forward. First, somatosensation is involved in many separate subfunctions supported by highly interconnected networks. The model identifies basic somatosensory processing and five higher-order networks involved in haptic object recognition and memory, body perception, body ownership, affective processing, and action. Second, the nodes within these networks are often multimodal in nature. This multimodal quality emerges from an early stage onwards. For instance, the concept of body image is now conceptualized as a network of different cortical regions in the occipital (EBA), the inferior parietal cortex, and the posterior insula, and all of these areas are multimodal in nature.

An important consequence of these two hypotheses is that damage to the multitude of processing nodes within the highly interconnected networks in the somatosensory 'system' may play a role in many different clinical phenomena. Given that from an early stage onwards many of the processing nodes are multimodal, it follows that the repercussions of lesions may affect behaviour in different ways characterised by deficits in touch or proprioception, but that it is also possible to affect behaviour in more intricate fashion, such as in Autism or Gilles de la Tourette syndrome. In this symposium, we will explore this proposition in more detail.

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01 Interacting Components of Body Perception in various Clinical Conditions

Chris Dijkerman[1]

[1]Psychology department, Utrecht University

An important function of the somatosensory system is to provide information about our body. Different aspects of the body can be perceived, such as the size of body parts (metric body perception), affective aspects like pain and pleasant touch (affective body perception), the experience of owning your body (body ownership) and the perception of the body structure (structural body perception). In our recent review (De Haan & Dijkerman, 2020), we suggested that they are subserved by overlapping neural networks. This would suggest that these components are also functionally linked.
In this presentation I will discuss evidence for the idea of functionally interdependent body perception components from studies in our lab with various clinical groups. I will present case studies that suggest that body ownership problems following stroke and brain tumor can be influenced by affective somatosensory input. Other evidence from stroke patients shows that problems in structural body perception (distinguishing left and right), is linked to body ownership problems. Studies with psychiatric

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patients also provides further insights into these interactions. In patients with anorexia, gaining ownership over a foreign body (part) temporarily reduces body size distortions. However, individuals with body integrity dysphoria, who experience that a body part, usually a leg, does not belong to their body, show normal size perception of the disowned body part and so do patients who experience somatosensory loss following stroke. Overall, these findings present evidence of how different body perception components interact. This is not only of interest for understanding the functional organization of body perception, but also provides pointers for how to reduce body perception disturbances in various clinical groups.

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02 Somatosensory Delusion in Embodiment/Disembodiment Neuropsychological Syndromes

Anna Berti[1]

[1]Psychology department, University of Turin

Body ownership (the feeling that my body and all its parts belong to me) depends upon, and is modulated by, bottom-up and top down processes that shape the way in which we perceive ourselves. Bottom-up processes are mediated by multisensory integration of incoming inputs (including tactile, visual and proprioceptive stimuli) while top-down processes, guided by pre-existing body representations, constrain the inference we may draw from external sensory events (Tsakiris & Haggard, 2005). Interestingly, somatosensory processes can be affected by the mental representations of the body (Serino and Haggard, 2010) and are characterised by both, operations whose product may remain implicit (do not enter subject's consciousness, e.g. Berti et al., 1998) and operations whose product become explicit (i.d. reported by the subject as conscious experience). To this respect, explicit, phenomenal experience, is considered veridical when it corresponds to an actual sensory stimulation, or non-veridical, if subjects report feelings that are not related to real external events. In this talk I shall review evidence of non-veridical somatosensory experience in neuropsychological syndromes where the feeling of body ownership is altered by the brain damage. In particular, I shall explore the phenomena of pathological embodiment and disembodiment where brain damaged patients either ascribe someone else's hand to their on body or claim that the contralesional hand belong to another person. In these syndromes, somatosensory sensation is altered in two ways. On the one hand, the somatosensory deficit can shape BO alteration; on the other hand, the altered body representation that characterises the delusions of ownership may guide patients' subjective somatosensory experience. Indeed, patients with pathological embodiment claim to feel the tactile stimuli delivered to the experimenter's hand, while patients with pathological disembodiment may not feel tactile sensation on the own hand even in absence of primary sensory deficit (Moro et al., 2004). Interestingly, patients' subjective experience has physiological counterparts, for instance in the variation of the skin conductance responses (SCR), consistent with their sensory delusion (Romano et al., 2014; Garbarini et al., 2014). It will be discussed how finding a relationship between subjective stories and objective data allows us to grasp the neurological, not confabulatory, reality of the sensory experience reported by patients. Furthermore, I shall argue how neuropsychological patients, unveiling the fact that the feeling of body ownership is fragile, liable to be confused, and easily deceived, offer an important model for describing the construction of somatosensory experience in healthy subjects. Indeed, the bottom-up and top-down processes that gate the phenomenal experience in patients may also shape the normal feeling of somatosensory experience (Garbarini et al., 2020; Berti, 2021).

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03 Somatomotor Processing in Tourette Syndrome

Stephen Jackson[1]

[1]School of Psychology, University of Nottingham, UK

Tourette syndrome (TS) is a hyperkinetic movement disorder characterised by the occurrence of chronic motor and vocal tics and is associated with alterations in the balance of excitatory and inhibitory signalling within cortical-subcortical brain networks leading to cortical hyperexcitability and altered physiological inhibition. Converging evidence indicates that abnormal brain network function in TS may be largely due to the impaired operation of GABA signalling resulting in the occurrence of tics. Importantly, TS has been linked to a heightened sensitivity to somatic stimulation and the majority of individuals with TS report that their tics are preceded by premonitory sensory phenomena that are described as uncomfortable bodily sensations

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that occur prior to the execution of a tic and are experienced as a strong urge for motor discharge (premonitary urges - PU).

Individuals who experience PU often report that: these experiences are more bothersome than their tics and that they would not exhibit tics if they did not experience PU. For this reason, it has been proposed that PU should be considered as the driving force behind the occurrence of tics

In this talk I will review evidence for alterations in somatosensory function in TS and consider the potential contribution of altered GABA signalling to sensorimotor dysfunction in TS. I will then review evidence that rhythmic peripheral nerve stimulation can be used to entrain cortical somatomotor brain oscillations linked to the initiation of movement and effectively suppress the urge-to-tic in Tourette syndrome.

Paper Session 20: Assessment and Intervention in cognition in Schizophrenia

14:00-15:20h
Friday, July 8, 2022

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01 Exploring Neuropsychological Performance as an Endophenotype in Schizophrenia Spectrum Disorders

Nancy Murillo-García [1] , Alexandre Díaz-Pons [1] , Luis Manuel Fernández-Cacho [1] , Margarita Miguel-Corredera [1] , Sara Martínez-Barrio [1] , Víctor Ortiz-García de la Foz [1,2] , Karl Neergaard [1] , Rosa Ayesa-Arriola [1,2]

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Introduction: Family studies provide a suitable approach to analyzing candidate endophenotypes of schizophrenia, including cognitive features.
Objective: To characterize different neurocognitive functions in a group of patients with first episode of psychosis (FEP), their first-degree relatives (parents and siblings), and healthy controls (HC), in order to identify potential endophenotypes for schizophrenia spectrum disorders (SSD).
Participants and Methods: Participants were assessed in the context of a national project in Spain called PAFIP-FAMILIAS. They completed the same neuropsychological battery, which included tests of verbal memory, visual memory, processing speed, working memory, executive functions, motor dexterity, attention, and theory of mind. Group comparisons were performed using one-way ANOVA, followed by tests of multiple comparisons when appropriate.
Results: One hundred thirty-three FEP patients were included, as well as 244 of their first-degree relatives (146 parents and 98 siblings) and 202 HC. In general, relatives showed an intermediate performance between the HC and the FEP patients in all neurocognitive domains. However, the domains of executive functions and attention stood out, as relatives (especially parents) showed similar performance to FEP patients. This was replicated when selecting patients subsequently diagnosed with schizophrenia and their relatives.
Conclusion: These findings suggest that executive and attention dysfunctions might have a family aggregation and could be relevant cognitive endophenotypes for psychotic disorders. The study shows the potential of exploring intra-family neuropsychological performance supporting neurobiological and genetic research in SSD.

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02 White Matter Correlates of Mentalising Subfields in Schizophrenia and the role of Interleukin-6

Tom Burke[1,2] , Laurena Holleran[1] , David Mothersill[1,3] , Sinead King[1] , Saahithh Patlola[1] , Karolina Rokita[1] , Nathan O'Rourke[1] , James Lyons[1] , Ross McManus[4] , Marcus Kenyon[4] , Colm McDonald[6] , Brian Halligan[1,6] , Aiden Corvin[6] , Derek Morris[1,5] , John Kelly[7] , Declan McKernan[7] , Gary Donohoe[1]

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Objective: The anterior cingulate cortex (ACC) is important for social cognition. Functional deficits in the ACC are associated with schizophrenia. The anterior corona radiata (aCR) is an important white-matter tract connecting the ACC to the striatum. Reduced fractional anisotropy (FA) on diffusion-tensor imaging (DTI) for the aCR are related differences in executive attention outcomes, in healthy controls. A recent ENIGMA-DTI meta-analysis (N=4322 people with schizophrenia [pwSZ]) showed specific differences in the corona radiata (CR), compared to typical controls. The CR can be segmented into anterior (aCR), superior (sCR), and posterior (pCR) regions. We hypothesise that the aCR will relate to social cognitive outcomes in pwSZ when compared to controls, and performance will be related to FA metrics. Recent literature shows that interleukin-6 (IL-6) moderates cognitive outcomes for pwSZ, therefore, we further hypothesise that IL-6 will relate to both DTI metrics and mentalising outcomes.
Participants and Methods: The current study was part of the ERC funded 'iRELATE' project (PI:GD). Data were derived from n=178 typical-controls (41% females; 36.11±12.36 years) and 58 pwSZ (30% females; 42.4±11.1 years). The Positive And Negative Symptom Severity Scale measured symptom severity. Social Cognition was measured using the Reading the Mind in the Eyes Test (RMET) Total Score, as well as the Positive, Neutral, and Negative stimuli valence. The ENIGMA-DTI protocol tract-based spatial statistics (TBSS) was used. For this study, the TBSS output included FA values for both right and left white matter tract regions of interest i.e., corona radiata, as well as segmented regions i.e., aCR; sCR; pCR. An average FA value (AFA) from all tracts was also included. Blood samples were taken as a baseline, and again during the assessment to measure stress markers and extract IL-6 markers.
Results: There were significant differences in FA on the CR ($p<.001$); on stratification the aCR and pCR were significantly different between groups ($p<.001$). There were significant negative correlations showing increased positive symptomatology in pwSZ related to reduced FA for the CR, specifically the aCR. All RMET outcomes i.e., total and each of the valence subtypes differed between groups ($p<.001$). For pwSZ, there was no association between the RMET total and the CR, however, negative valence significantly correlated with the left aCR ($r=.307$, $p=.019$). This finding was not generalised to the sCR, pCR, or AFA. IL-6 significantly and negatively related to FA in the aCR, but not other regions, across both left and right hemispheres ($p=.002$; $p=.014$, respectively). Lastly, IL-6 significantly and negatively correlate with behavioural performance on the negative valence of the RMET ($r=-.384$, $p=.008$).
Conclusions: These data highlight specific and significant microstructural white-matter differences for pwSZ, which relates to positive symptomology. Reduced fractional anisotropy was observed in left aCR, associated with reduced social cognition, specific to negative stimuli. Structural and behavioural data correlate with IL-6 markers. These findings may benefit other fronto-striatal disconnection syndromes, as recent evidence has shown that FA specifically in the aCR can be increased with intervention. Consequently, this may be a specific biological region of interest as a cognitive-remediation or social recovery biomarker.

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03 The utility of EPICOG-SCH screening battery in clinical settings: A case series of cognition and functionality

Silvia Zaragoza Domingo[1] , Julio Bobes[2] , Manuel De Gracia[3] , Bernat Campins[4] , Gemma Escartin[5] , Maria Paz García-Portilla[2] , Silvia Moron[6] , Jolanda Ruiz[7]

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Objective: The Epidemiological Study of Cognitive Impairment in Schizophrenia (EPICOG-SCH) is a brief battery to screen for cognitive impact of schizophrenia in outpatient settings. The EPICOG-SCH includes well-known subtests available worldwide that cover key cognitive domains demonstrated to be related to a variety of functional outcomes: Letter-Number-Sequencing-LNS, Category Fluency Test-CFT, Logical-Memory Immediate Recall-LM, and Digit-Symbol-Coding-DSC. A composite score is derived from the battery, which is based on algorithms modelled to predict patient's functionality in daily life. Functional composite scores (FWCS) showed adequate discriminant capacity in identifying patients with up to moderate disability levels

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with fair discriminant accuracy, areas under the curve (AUC) > 0.70, p < 0.0001 from a receiver-operating characteristic (ROC) method. A FWCS cut-off ≥ 96 provided the best balance between sensitivity (0.74) and specificity (0.62). We want to confirm the constancy of the results obtained using this method with illustrative cases obtained from different mental health clinical practice settings.
Participants and Methods: We present 10 case series of schizophrenia patients living in the community attending for routine visits mental health services. Patients were selected to show different levels of functionality in the main five domains measured in the WHO-DAS-S (self-care, home care, family and work), a narrative review of each case is presented together with results from cognitive evaluation with the EPICOG-SCH including scalar scores and the functional composite score quantitative and qualitative results.
Results: The review of cases has shown that in the context of outpatient mental health services, the results derived from EPICOG-SCH administration to patients were consistent with clinician's narratives with regards patient independence in basic functional domains. Therefore the innovative FWCS global composite score provided reliable information on the cases associated functionality.
Conclusions: The EPICOG-SCH is administered in less than 20 minutes, proved to be a useful first to screen for the cognitive impact of schizophrenia and second to ascertain the associated functionality in daily life. To date it has not been described an efficient and straightforward way for clinicians working with schizophrenia to transfer information about patient cognitive profile into real life. The EPICOG-SCH modelled FWCS global composite score provides valuable information to clinicians which can facilitate disease management, drawing a roadmap for cognitive rehabilitation, and planning of supportive resources from the community and health care system.
The innovative FWCS, constitutes an efficient complement to standard clinical interviews for setting a theoretical patients' independence score, which can be used as a quantitative measure for follow up purposes. Future research is needed to ascertain the utility of this new battery to follow up patient's cognitive performance across clinical visits, to stablish its stability on clinically stable samples and its utility to monitor drug adjustments and its corresponding impact on patient functionality. In addition, additional validation work and calibration of the algorithm in different world geographical regions is needed. This will provide a more accurate result reflecting variations on cultural attitudes towards patients suffering from severe mental health disorders in the community.

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04 Epigenetic Effects Of Cognitive Remediation Therapy In Persons With Schizophrenia

Rafael Penadés[1,2,3] , Carmen Almodóvar[5,6] , Clemente García-Rizo[1,2,3] , Silvia Amoretti[1,4] , Victoria Ruiz[1] , Rosa Catalán[1,2,3] , Mar Fatjó-Vilas[4,5,6] , Bárbara Arias[4,5]

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Objective: Cognitive remediation therapy (CRT) is confirmed as an effective treatment as it produces significant improvements on cognitive functioning, symptoms and global functioning in the context of schizophrenia. However, molecular changes underlying cognitive recovery in the process of CRT is poorly understood. Although CRT is premised on the principle of neuroplasticity, the precise neurobiological processes underlying cognitive recovery following CRT in schizophrenia remains scarcely investigated. Regarding cognitive recovery in schizophrenia, dynamic processes of DNA methylation and demethylation have been linked to cognitive function. The main objective of the current study was to test the effect of cognitive improvement that usually follows the implementation of CRT on the methylation levels of the *BDNF* gene.
Participants and Methods: A randomized and controlled trial was carried out in a sample of participants with schizophrenia (n = 60) with two arms: CRT and treatment as usual (TAU). Outcome measures included DNA methylation of genes central to synaptic plasticity (CpG sites of *BDNF* promoters) and global scores of a cognitive battery, symptoms scale and global functioning.
Results: CRT group showed significant improvements in cognition (p <0,001) and other

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variables like symptoms (p= 0.023) and functioning (p <0,001). Interestingly, different methylation patterns were found in 4 CpG sites of the *BDNF* gene in the two groups CRT and TAU. patients with schizophrenia. First, the CpG site BDNF_CGI1_CpG_5 showed less methylation in the CRT group compared to TAU (p = 0.007). For the CpG sites BDNF_CGI1_CpG_12, BDNF_CGI1_CpG_24.25 and BDNF_CGI1_CpG_28, the CRT group presented higher levels of methylation compared to the TAU group (p = 0.007, p = 0.039 and p = 0.034, respectively).
Conclusions: The results obtained in the methylation analysis show how cognitive remediation induces significant changes in the degree of methylation of certain CpG sites of promoters of the *BDNF* gene in patients with schizophrenia. Those findings provide a neurobiological insight into biological mechanisms of cognitive recovery in terms of DNA methylation of genes that are central to synaptic plasticity. Hopefully, if those data were replicated, methylation patterns and gene expression profiles could be acting as biomarkers of response and they would help clinicians in providing more personalized treatments.

Paper Session 21: Neurodevelopmental neuropsychology

14:00-15:20h
Friday, July 8, 2022

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01 A Meta-Analytic Review of Memory in Children Born Very Preterm or with Very Low Birthweight

Paulina M. Stedall[1,2] , E. Sabrina Twilhaar[3] , Megan M. Spencer-Smith[1,2] , Emma F. Campbell[1] , Rebecca N. Brown[1,2] , Alice C. Burnett[2,4,5] , Peter J. Anderson[1,2]

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Objective: Children born very preterm (VP; < 32 weeks' gestation) and/or very low birthweight (VLBW; < 1,500g) are susceptible to memory impairments, with consequences for everyday and academic functioning. Understanding memory in this population would guide family counselling, assessment, and development of interventions. This meta-analysis aimed to examine working memory, episodic memory and prospective memory in children born VP/VLBW compared with term-born or normal birthweight peers. The influence of sociodemographic and perinatal factors on between-study heterogeneity was also explored.
Participants and Methods: Peer-reviewed articles were searched via MEDLINE, PsycINFO, Scopus and Embase. Original empirical cohort studies were included if they reported memory outcomes in a representative sample of children born VP/VLBW aged 6 to 18 years and included a control group. Outcomes of interest were verbal and visuospatial working memory, episodic memory (verbal and visuospatial learning, immediate and delayed recall, recognition) and prospective memory, assessed using standardized measures. Random-effects meta-analyses were used to compare memory in children born VP/VLBW with controls. Sources of heterogeneity between study effect sizes were explored using sensitivity analysis and random-effects meta-regression.
Results: Overall, 62 studies met selection criteria, which covered 33 unique cohorts of children born VP/VLBW (n = 4,159) and controls (n = 4,033). Small-to-moderate reductions in performance were evident in the VP/VLBW group compared with controls across verbal (Standardized Mean Difference -0.44; 95% Confidence Interval -0.54, -0.34) and visuospatial working memory (-0.57; -0.67, -0.47). Compared with controls, the VP/VLBW group showed small decreases in verbal learning and immediate recall (-0.26; -0.48, -0.05) and delayed recall/recognition (-0.25; -0.41, -0.10) as well as moderate decreases in visuospatial learning and immediate recall (-0.69; -0.94, -0.44) and delayed recall/recognition (-0.44; -0.76, -0.11). Paucity of literature precluded analysis of prospective memory. Poorer verbal working memory was associated with lower gestational age (R^2 = 33%) and more recent birth year (R^2 = 31%). Heterogeneity in aspects of episodic memory across studies was not explained by differences in measures or study quality, although there were too few studies to examine the effect of gestational age, birthweight, birth year, sex or age.
Conclusions: Children born VP/VLBW are vulnerable to memory difficulties, particularly

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in working memory and visuospatial episodic memory, with potential consequences for everyday functioning and academic success.

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02 Pervasive Episodic and Selective Prospective Memory Difficulties in 13-Year-Old Children Born Very Preterm

Paulina M. Stedall[1,2] , Megan M. Spencer-Smith[1,2] , Suncica Lah[3] , Lex W. Doyle[2,4,5] , Alicia J. Spittle[2,7,8] , Alice C. Burnett[2,4,5] , Peter J. Anderson[1,2]

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Objective: Children born preterm are vulnerable to cognitive impairments and neuroanatomical alterations that increase their susceptibility of memory deficits; however, their episodic and prospective memory abilities are under researched. This study comprehensively examined episodic and prospective memory performance in children born very preterm (VP; < 30 weeks' gestation) compared with term-born controls at thirteen years.
Participants and Methods: A group of 81 VP (mean corrected age 13.4, SD 0.4) and 26 term-born controls (13.3, 0.3) were assessed. The Children's Memory Scales Dot Locations and Word Pairs subtests were used to measure visuospatial and verbal episodic memory, respectively. An experimental behavioral measure of prospective memory comprised event-based and time-based tasks, administered at short (within session) and long (one-week post-session) delays. Parents reported everyday memory difficulties on the Observer Memory Questionnaire – Parent Form. Group differences were estimated using regression models adjusted for confounders (multiple births, social risk factors, age).
Results: Compared with controls, the VP group consistently performed more poorly on all measures of episodic memory, with mean differences ranging from -1.8 (95% confidence interval [CI] -3.1, -0.6) to -1.2 (-1.9, -0.6). Poorer performance was evident in the VP group compared with controls for short-term (-1.1; -1.8, -0.4) and time-based (-1.0; -1.6, -0.4), but not long-term (-0.01; -0.5, 0.5) or event-based (-0.2; -0.8, 0.5) prospective memory. Parent ratings indicated greater odds of everyday memory difficulties in children born VP compared with controls (odds ratio 12.1, 95% CI 3.3, 45.1).
Conclusions: VP birth increases risk of episodic, prospective, and everyday memory difficulties in children aged thirteen years, highlighting the need for ongoing surveillance and development of targeted interventions. Further research in larger populations of children born preterm compared with term-born children in relation to episodic, prospective, and everyday memory is warranted.

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03 Longitudinal Changes in Cognitive Functioning in Extremely Low Gestational Age Newborns: Ages 2 to 15 Years

Stephen Hooper[1] , Robert Joseph[2] , Hudson Santos[3] , Xianming Tan[4] , Rachana Singh[5] , Jean Frazier[6] , Karl Kuban[2] , Rebecca Fry[4] , Thomas O'Shea[1]

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Objective: A large number of cross-sectional studies have shown poorer cognitive outcomes for preterm and very low birth weight samples when compared to term-born samples, while as many as 20 longitudinal studies have shown similarly poor cognitive outcomes (Luttikhuizen dos Santos et al., 2013). Of available longitudinal studies, 4 investigated cognitive development from about 24 months (Doyle et al., 2015; Evensen et al., 2009; Linsell et al., 2018; Stalnacke et al., 2019) through adolescence. We set out to evaluate longitudinally overall cognitive development as well as verbal and nonverbal abilities while including novel covariates in the models to examine targeted predictors of cognitive development in this population.
Participants and Methods: Participants were 659 extremely preterm (EP) born children

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prospectively followed in the ELGAN Study who had at least 2 IQ measures across all time points (age 2, 10, 15 years). Outcome measures included age-appropriate developmental/intellectual measures at each time point: Bayley Scales of Infant Development-II, Differential Ability Scales-2, and the Wechsler Abbreviated Scales of Intelligence-II. Covariates included prenatal and SES characteristics newborn characteristics (sex, gestational age in weeks, birth weight z-score), neonatal comorbidities (ultrasound-defined white matter damage, BPD, sepsis), and elevated circulating inflammatory proteins in the first two weeks of life. Linear Mixed Models were employed to examine the 3 development/IQ outcomes.

Results: Across the 659 participants, there was approximately 1,674 testing observations at ages 2, 10, and 15 years. Results from the Linear Mixed Models analyses showed an increase in verbal, nonverbal, and overall cognitive abilities over the course of their development from infancy into middle adolescence. Mean scores for verbal, nonverbal and combined abilities increased over the course of 13 years, with this gain amounting to little more than 1 to 2 points over the 13 years after adjustment. This positive trajectory was not uniform in its manifestation with significant variability being present with respect to individual case trajectories over time. After adjusting for key covariates in the newborn time period, infants with longer gestational age (27 weeks) contributed to gains across all three cognitive outcomes, while those who did not meet criteria for small for gestational age showed significant positive gains in their verbal and combined cognitive abilities. In contrast, for all three cognitive outcomes, male sex, those with cerebral white matter damage, the need for oxygen/ventilation in the newborn period, and four or more inflammatory proteins in the first two weeks of life experienced less cognitive growth over the-13-year time period.

Conclusions: In one of the largest longitudinal investigations of cognitive function after extremely preterm birth, and one of the few studies extending into middle adolescence, we found that long-term cognitive outcomes changed little over time. Early infant markers influenced cognitive change, with positive health indicators reflecting better overall cognitive outcomes, and problematic health histories (i.e., white matter damage, oxygen/ventilation use, circulating inflammatory proteins) being associated with less cognitive growth. These findings describe critical early social and biological factors that can affect long-term cognitive development in an extremely premature sample, and lay the foundation for early intervention for this at-risk population across international boundaries.

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04 Contribution Of The Social Cognition Evaluation Battery "Clacos" In Autism Spectrum Disorder

Shasha Morel-Kohlmeyer[1,2,3] , Charlotte Danset-Alexandre[3,4] , Alix Thillay[3,5] , Sylvie Roux[2] , Isabelle Amado[3,6,7] , Lindsay Brenugat[3,6,7] , Isabelle Carteau-Martin[3] , Baptiste Gaudelus[3,8] , Jérôme Graux[2,3,5] , Elodie Peyroux[3,8,9] , Zelda Prost[3,10] , Marie-Odile Krebs[3,11,] , Nicolas Franck[3,8,1] , Frédérique Bonnet-Brilhault[1,2,3] , Emmanuelle Houy-Durand[1,2,3]

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Objective: Autism Spectrum Disorder (ASD) is characterized by impairments in social communication and interaction and limited interests and repetitive behaviour. Although social communication impairments are probably shared across several psychiatric disorders

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including autism, schizophrenia, anxiety disorders and ADHD, they are not well characterized, due to a lack of standardized evaluation tools, especially in adult populations. Our multicentric research group in psychiatry GDR3557 (Institut de Psychiatrie) developed a new battery for social cognition evaluation named "ClaCoS", in order to discriminate specific profiles of social cognition disorders that could be common or specific, respectively to autism and schizophrenia. We considered social cognition as a multidimensional process, and examined four components of social cognition: Emotion Recognition, Theory of Mind, Attributional Style and Social Perception and Knowledge. It also provides an assessment of subjective complaints in social cognition. Goal: To assess the relevance of the "ClaCoS" battery in the evaluation of social cognition impairments in ASD.
Participants and Methods: We compared the social cognition abilities of 45 ADS adults without intellectual disability and 45 neurotypically developed volunteers using "ClaCoS". A correlational approach allowed us to test the links between subjective complaints and objectively measured impairments for the different components of social cognition.
Results: The ASD group showed deficits in all four components of social cognition. Furthermore, ASD adults reported greater subjective complains regarding their social abilities, which were correlated to the neuropsychological assessments.
Conclusion: The "ClaCoS" battery is an interesting functional tool allowing to assess social impairments in autism and to specify the altered components, for a better adjustment of tailored social cognition training programs. Our results further suggest that ASD adults have a good social cognitive insight, i.e., awareness into social cognitive functioning, and may thus benefit from social cognitive training tools.

05 Emotions in adolescents with history of emotional neglect: fMRI Study

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Objective: This study aimed to evaluate the recognition of basic emotions with both an isolated and a contextual emotion recognition task and to assess the experience of social emotions (envy and Schadenfreude) in a group of neglected adolescents with comparison with a control group with no histories of neglect. These processes, we analyzed the gray matter (GM) volumes and functional connectivity (FC) correlates of processes.
Participants and Methods: Group of neglected adolescents (n = 30), whilst contrasting them with a control group (n = 30) with no histories of neglect. The neglected adoelescents lived with their biological families, whereas their parents had substantiated and confirmed allegations of neglect. We used the INECO Frontal Screening (IFS) battery and contextual emotion recognition task. In addition, we scanned participants using a 3T Magnetom Skyra Intera scanner equipped with a 32-channel head coil for Voxel-Based Morphometry (VBM) and Functional connectivity (FC) analysis.
Results: No significant differences were found between groups in the recognition of isolated facial emotions. However, we observed lower scores in the contextual emotion recognition task and higher scores in envy and Schadenfreude in neglected adolescents. Moreover, we found lower the gray matter volumes in right middle frontal gyrus, precuneus, superior occipital gyrus, occipital cortex, and superior frontal gyrus. Also in neglected adolescents, we observed lower FC in key hubs of social cognition.
Conclusions: Our results highlight how the lack of close emotional contact received while growing up in a neglectful household can impair contextual emotion recognition.

06 Perceived Cognitive Impairment and Psychosocial Adversity in High School Students

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Objective: We examined the association between psychosocial adversity and perceived cognitive impairment in high school students who completed the Youth Risk Behavior Survey (YRBS) conducted by the United States Centers for Disease Control and Prevention.
Participants and Methods: Participants were a national sample of high school students who completed the YRBS in 2019. Perceived cognitive impairment was assessed with the question: "Because of a physical, mental, or

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emotional problem, do you have serious difficulty concentrating, remembering, or making decisions?" Response options were binary: "Yes" or "No." Students' responses were then evaluated in relation to an Adversity Index, created for this study, that included the sum of positive endorsements to 16 questions (i.e., feeling depressed, suicidality, physical dating violence, binge drinking, smoking cigarettes, using marijuana, using illicit drugs, lifetime history of sexual abuse, sexual assault in the past year, feeling unsafe at school, feeling threatened at school, sleeping five or fewer hours on school nights, engaging in no physical activity, receiving D or F grades in school on average, being bullied at school, or being bullied electronically).
Results: Participants were 8,349 students, ages of 14 and 18, including 4,093 boys (49%) and 4,256 girls (51%). A large percentage of students reported difficulties concentrating, focusing, and remembering due to physical, mental, or emotional problems (i.e., 37.8%). Girls (45.4%) were significantly more likely, on average, than boys (29.9%) to report these cognitive difficulties [χ^2(1, 8,349)=212.23, p<.001; odds ratio (OR)=1.95, 95% confidence interval (CI)=1.78-2.13]. Girls obtained higher scores on the Adversity Index (Md=2, IQR=1-4) than boys (Md=1, IQR=0-3; Mann Whitney U=10,319,102.50, p<.001). There was a linear positive association, for both girls and boys, between the number of adversities endorsed and the percentages of adolescents endorsing cognitive impairment. Girls who endorsed experiencing one psychosocial adversity were significantly more likely to report cognitive impairment (30.3%) than boys who endorsed one psychosocial adversity (24.5%) [χ^2(1, 1,864)=7.62, p=.006; OR=1.33, 95% CI=1.09-1.64]. This pattern continued for girls compared to boys who reported experiencing two psychosocial adversities (girls=42.4%, boys=29.8%, p<.001; OR=1.73, 95% CI=1.39-2.16), three psychosocial adversities (girls=58.3%, boys=45.5%, p<.001; OR=1.67, 95% CI=1.30-2.15), 4-5 psychosocial adversities (girls=69.5%, boys=52.7%, p<.001; OR=2.05, 95% CI=1.60-2.61), 6-7 psychosocial adversities (girls=74.8%, boys=65.4%, p<.001; OR=1.57, 95% CI=1.05-2.35), and 8 or more psychosocial adversities (girls=83.4%, boys=69.3%, p<.001; OR=2.23, 95% CI=1.22-4.06). In contrast, among students who did not report experiencing any psychological adversity (n=2,115, there was not a significant difference in perceived cognitive difficulties endorsed between girls and boys (girls=15.4%, boys=13.0%, p=.119; OR=1.22, 95% CI=0.95-1.56).
Conclusions: A remarkably large proportion of high school students in the United States reported experiencing serious difficulty with their cognitive functioning over the past year. Girls were significantly more likely to endorse perceived cognitive difficulties compared to boys. There was a strong association between perceived cognitive impairment and the experience of psychosocial adversity. However, among students who do not report experiencing psychosocial adversity, there was no significant gender difference in the percentages endorsing perceived cognitive difficulties.

Paper Session 22: Cognition, biomarkers and dementia

14:00-15:20h
Friday, July 8, 2022

01 Learning Capacity in Early-Stage Alzheimer's Disease: The Role of Feedback and Errors

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Objective: A possibly effective method to improve learning outcome in patients with early-stage Alzheimer's disease (AD) is errorless learning (EL), in which the occurrence of errors is prevented as much as possible during the acquisition of new information. However, results are mixed as studies have also found beneficial effects of trial and error learning (TEL) during acquisition, in which participants have to learn and adapt their behavior based on positive and negative outcomes. Little is known about the mechanisms through which the beneficial effects of EL and TEL occur. In this study, we investigated the role of negative (i.e., punishment) and positive feedback (i.e., reward) on memory outcome and participants' ability to adjust their behavior accordingly.
Participants and Methods: In this study, 23 early-stage AD patients were recruited (Clinical Dementia Rating scale = 0.5 or 1) and 23 matched healthy controls. We administered a novel computerized learning task, the Drawer

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Task, which is an object location memory task with an EL and TEL condition. Participants were instructed to find out and memorize the locations of everyday objects in a chest of drawers. In this task the number of errors made before the correct drawer was 'found' during the acquisition phase was pre-determined (varying from 1 to 5 errors), of which participants were unaware. Also, a probabilistic associative reversal learning task was used to measure the ability to adjust behavior based on positive (i.e., reward) and negative (i.e., punishment) feedback. Participants had to learn through TEL which of two presented abstract visual stimuli was most often followed by positive feedback. Positive and negative feedback was provided on 80% and 20% of the trials, respectively, for one stimulus. Importantly, the stimulus most likely to lead to positive feedback switched multiple times across the 6 blocks of the task. Performances on the associative learning task were measured by the proportion of errors made and to what extent the heuristic learning strategies 'Win-Stay' (WS) and 'Lose-Shift' (LS) were used. WS was defined as the trials in which participants selected the same stimulus after positive feedback. LS was defined as the trials in which the participants selected the other stimulus after negative feedback.
Results: The results showed a beneficial general effect of EL on memory performance for object locations ($p < .001$) on the Drawer Task. This EL advantage was not larger in AD patients compared to controls ($p = .546$). Also, the number of errors per block was unrelated to the learning outcome ($p = .782$). Although AD patients more often did not respond within the time limit on the associative learning task ($p = .018$), both the proportion of errors and heuristic strategies, WS and LS, did not differ compared to controls (respectively, $p = .767$, $p = .533$, $p = .746$).
Conclusions: Memory performance is affected by whether or not errors occur during learning, both in AD and cognitively unimpaired older adults. However, impact of feedback on performance did not differ between AD patients and controls.

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02 Favorites test is associated with amyloid and p-tau181 positivity in cognitively unimpaired individuals

Anna Brugulat-Serrat[1,2,3] , Elena Tsoy[6] , Gonzalo Sánchez-Benavides[1,2,3] , Alba Cañas-Martínez[1] , Lidia Canals-Gispert[1] , Marta Milà-Alomà[1,2,3] , Marc Suárez-Calvet[1,2,3] , Oriol Grau-Rivera[1,2,3] , Carolina Minguillon[1,2,3] , Karine Fauria[1,2,3] , Juan Domingo Gispert[1,2,7] , Joel H. Kramer[6] , Katherine Possin[6] , EPAD Consortium[8]

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Objective: There is growing evidence that Alzheimer's disease (AD) pathology [amyloid-b (Ab) and phosporilated tau]) impacts cognition in asymptomatic individuals in cross-sectional and longitudinally, mainly captured by memory tasks in cross-sectional and longitudinal studies. Sensitive cognitive measures that allow detecting individuals at-risk of AD in early disease stages are essential to enhance early detection and identification of candidates for clinical trials. In this study, we examine whether the Favorites test, a digital measure of associative memory, differs among AT groups in a sample of cognitively unimpaired (CU) individuals from the European Prevention of Alzheimer's Disease (EPAD) consortium.
Participants and Methods: The study included 776 cognitively unimpaired participants (CDR=0, mean age 65.1 [6.8] years, 57.7% females) from the multicenter EPAD Longitudinal Cohort Study. All participants underwent a lumbar puncture, and cerebrospinal fluid (CSF) Ab42 and p-tau levels were measured (Roche Elecsys®). A threshold of 1000pg/ml for Ab42 was applied for determining amyloid positive stuatus (A+), and higher than 27 pg/mL for p-tau181 positivity (T+). As the aim was to identify individuals at risk for AD dementia, the A-T+ group was excluded from the analyses. Hippocampal volumes (HV) were obtained from the T1w MRIs with LEAP framework. Associative memory was assessed by the Favorites digital test on TabCAT platform (UCSF, San Francisco, CA), in which participants were asked to learn and remember 4 people's faces and their favorite food and animals. Accuracy was summed across two immediate recall and one 10-minute delayed recall trials. We

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conducted two multinomial logistic regression models to examine whether Favorites performance is associated with AT stages. In the first model age, *APOE-e4* status, and site of data collection were introduced as covariates. In model 2, we additionally covaried for the HV (Total Intracranial Volume [TIV] adjusted residuals).
Results: The reference group (A-T-) was compromised of 546individuals (70.4%). 193 participants (24.9%) were classified as A+T- stage and 37 (4.8%) as A+T+. Compared to A-T-, A+T+ were significantly older, encompassed a higher proportion of *APOE-e4* carriers, and showed lower performance on Favorites (table 1). In model 1, A+T+ individuals scored significantly lower in Favorites than the reference group (p=0.016). No significant difference was found between A-T- and A+T- in Favorites performance. Results remained significant after covarying for HV (model 2, p<0.001). Individuals in the A+T+ also showed significantly worse scores in the Favorites test compared with A+T- in both models (p=0.021, and p=0.014 respectively) (Table 2, Figure 1).
Conclusions: Our results show that in asymptomatic CU individuals, Favorites performance is significantly associated with Ab and p-tau181 positivity. Given its sensitivity to preclinical stages of AD, Favorite represents a valuable alternative to traditional brief memory tests for clinical and research applications. Our findings contribute to the need for neuropsychological measures that can detect cognitive changes in the early AD continuum to identify individuals at-risk of AD and track the progression of these cognitive deficits.

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03 Discrepancy Between Visual and Verbal Working Memory is Related to PTau217 in abnormal Amyloid-β Individuals

Gonzalo Sánchez-Benavides[1,2,4] , Lidia Canals-Gispert[1] , Alba Cañas-Martínez[1] , Anna Brugulat-Serrat[1,2,4] , Marta Milà-Alomà[1,2,4] , Marc Suárez-Calvet[1,2,4] , Carolina Minguillon[1,2,4] , Thomas Karikari[7,8] , Nicholas Ashton[7,9,1] , Henrik Zetterberg[7,11,] , Kaj Blennow[7,12] , Juan Domingo Gispert[1,2,5] , Oriol Grau-Rivera[1,2,4]

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Objective: The emergency of cognitive discrepancies between verbal and visuospatial skills in earlies stages of Alzheimer's disease (AD) has been consistently described. Some reports suggested that visual episodic memory is more affected and predictive of clinical progression than verbal memory in Mild Cognitive Impairment (MCI). Recently, this evidence was extended to measures of working memory (WM). A recent report (Emrani et al. 2019;doi:10.1017/S1355617719000808) found worse performance in the WMS-IV Symbol Span test than WAIS-IV Digit Span Backwards in MCI patients. In the present study, our main objective was to explore whether such discrepancy can be observed in cognitively healthy individuals at risk of AD dementia (with evidence of abnormal amyloid-β (Aβ) levels in cerebrospinal fluid [CSF] and if it is related with sensitive novel phosphorylated-tau (p-tau) measurements.
Participants and Methods: The study included 380 cognitively unimpaired participants (mean[SD] age: 61[4.7] y.o., mean[SD] education:13.5(3.5) years, 60.8% females) from the ongoing ALFA+ research cohort who underwent a lumbar puncture and a cognitive assessment. Visual and verbal WM were assessed by WMS-IV Symbol Span (SS) and WAIS-IV Digit Span (Direct, Backwards and Sequencing) tests respectively. We computed visual vs verbal WM discrepancy scores by subtracting Digit Span z-scores from SS z-scores (negative scores means worse

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performance in visual WM). A threshold of 0.071 in CSF Aβ42/40 ratio was applied for determining Aβ+ status (Milà-Alomà et al., 2020, doi.org/10.1002/alz.12131), measured with the NeuroToolKit robust prototype assays (Roche Diagnostics, Rotkreuz, Switzerland). CSF p-tau181, p-tau217 were measured with Simoa and CSF p-tau231 with an ELISA. We constructed linear models with the WM discrepancy scores as dependent variables, Aβ status and p-tau measures as predictors, and age, education and sex as covariates. Interactions between Aβ status and p-tau measures were and stratified analysis were also modeled.
Results: WM discrepancy scores were normally distributed, SSvsDirect, mean(SD)=-0.02(1.2); SSvsBackwards, mean(SD)=-0.03(1.1); SSvsSequencing, mean(SD)=0.04(1.1). We found a significant negative impact of age on SSvsDirect and SSvsBackwards scores ($p<0.001$). No gender or education effects were observed. 114 (35%) of the individuals were classified as Aβ+. Although no main effect of Aβ status or p-tau measures were found for any WM discrepancy score, we observed significant Aβ*CSF p-tau217 interactions for SSvsBackwards ($p=0.052$) and SSvsSequencing ($p=0.040$). After sample stratification by Aβ status, we observed that Aβ+ displayed a negative association between p-tau217 levels and WM discrepancy scores (SSvsBackwards, B=-0.593; 95% CI [-1.158, -0.029]: $p=0.04$); SSvsSequencing, B=-0.595; 95% CI [-1.203, 0.014]: $p=0.055$).
Conclusions: Our results showed that worse visual WM performance as compared to verbal WM is associated with increased CSF p-tau217 in cognitively unimpaired individuals harboring Aβ pathology. These results suggest that subtle cognitive discrepancies can be captured at the preclinical stage of AD, and support the usefulness of CSF p-tau217 over other p-tau measures as a sensitive marker of early AD-related tau pathology that may be associated to subtle cognitive changes.

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04 The Recency Ratio in Story Recall Predicts Dementia Biomarkers

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Objective: In memory research, recency refers to information learned at the end of a study list or task. The recency ratio (Rr) is operationally defined as the ratio between recency recall in immediate compared to delayed recall conditions. Rr has been applied to list-learning tasks (e.g., AVLT), demonstrating its efficacy in predicting cognitive decline, conversion to mild cognitive impairment (MCI), and biomarkers of neurodegeneration. Our aims were to: 1) test whether Rr can be effectively applied to story recall; 2) determine the degree to which Rr predicts biomarkers of dementia and neurodegeneration in cerebrospinal fluid (CSF); and 3) ascertain whether Rr is more predictive than traditional scoring of immediate and delayed recall performance.
Participants and Methods: Data were obtained from the Alzheimer's Disease Research Center at the University of Wisconsin – Madison. Total sample size was 214 participants, of whom 157 were cognitively intact at baseline, 26 had a diagnosis of MCI, and 31 had a diagnosis of dementia**.** CSF biomarkers were measured using the exploratory Roche NeuroToolKit assays, a

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panel of automated robust prototype immunoassays (Roche Diagnostics International Ltd). CSF biomarkers in the analysis were amyloid-beta (Ab) 40 and 42, phosphorylated (p) and total (t) tau, neurofilament light (NFL), neurogranin (Ng), and alpha-synuclein (a-syn). Story recall was measured with story A of the Logical Memory Test (LMT), immediately after presentation and a delay. Rr was calculated dividing performance for the last eight items in the immediate LMT task by the corresponding performance in the delayed LMT task, with a small adjustment applied to avoid zero scores. We carried out exploratory regression analyses with Rr, or immediate and delayed LMT score as predictors (in separate models); age at the lumbar puncture, time elapsed between lumbar puncture and memory assessment, sex, years of education, consensus diagnosis at lumbar puncture, and polygenic risk score were used as control variables; and CSF biomarkers were used as outcomes, in separate analyses. We carried out separate longitudinal (using baseline LMT scores and longitudinal CSF) and cross-sectional (using LMT scores closest in time to the lumbar puncture) analyses. Due to the high number of tests, p values are reported after false discovery rate adjustment.
Results: Longitudinal regression analyses showed Rr to be significantly associated with Ab40 (p=.021), p-tau (p=.005), t-tau (p=.005), NFL (p=.033), Ng (p=.005) and a-syn (p=.005), but not with Ab42. LMT Immediate total score was only significantly associated with NFL (p=.028) and LMT Delayed total score was not significantly associated with any CSF measure. Cross-sectional regression analyses showed Rr to be significantly associated with p-tau (p=.007), t-tau (p=.007), Ng (p=.007) and a-syn (p=.034), but not with Ab40, Ab42 or NFL. LMT Immediate total score was only significantly associated with NFL (p=.034) and LMT Delayed total score was not significantly associated with any CSF measure.
Conclusions: These findings demonstrate the applicability of Rr to story recall, its sensitivity to biomarkers of neurodegeneration both longitudinally and cross-sectionally, and its superiority to traditional scoring of immediate and delayed recall story performance.

Paper Session 23: Management and clinical decisions following TBI

15:30-16:50h
Friday, July 8, 2022

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01 Audit of Pathway of Patients in Disorders of Consciousness in a Scottish Inpatient Neurorehabilitation Setting

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Objective: Prolonged Disorders of Consciousness (PDoC) can occur following Acquired Brain Injury (ABI). PDoC patients are complex in nature and benefit from specialist long term rehabilitation, assessment and review. Unfortunately, at present, it is difficult to capture the true prevalence rate of this population across the UK. This report aimed to audit the number of patients in a PDoC referred to a Scottish inpatient neurorehabilitation service and the impact of having a specialist PDoC pathway that aligned with the Royal College of Physicians recommendations. This audit also aimed to compare the outcomes and discharge destinations following neurorehabilitation of patients admitted in a disorder of consciousness following the development of this pathway (2016-2018) with those admitted over a similar time period prior to the onset of the new pathway (2013-2015).
Results: The AAH pathway described in this paper, has highlighted the benefits of a skilled and coordinated MDT, with professionals experienced in use of medication and assessment for PDoC. In particular, the present audit shows that when PDoC patients are ready for discharge from acute hospital, a clinical pathway that supports transfer to a neurorehabilitation hospital focusing on the assessment and rehabilitation of PDoC, improves destination outcome and the need for a gastrostomy. Patient trajectories were better after admission to the specialist PDoC neurorehabilitation pathway. Forty-eight percent of patients improved from VS to MCS or emerged from a DoC after the pathway was implemented, compared to 3% who were transferred to a hospital without a specialist pathway in the previous year. In addition, data gathered suggested there was also a trend towards reduced acute hospital stay.

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Conclusions: The present audit highlights some areas for development in Scotland in terms of service delivery, which include patient identification, level of expertise or training. Although the prevalence of PDoC is low, cases can be highly medically complex and require significant care input. Given the recent development of Major Trauma Centres, Scotland is in a prime position to make a significant change in the life and outcomes of these patients. It is vital that regional health boards consider what is currently offered for these patients, and that a National Standard for care of PDoC for Scotland is set to improve outcomes for these patients and so that they continue to receive the most fair and ethical service throughout their journey

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02 Case Management for People with Acquired Brain Injury and Their Family

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Objective: Many patients with acquired brain injury (ABI) and their family members experience psychosocial problems and unmet needs in the long term. Currently there are no structural and integrated health care services supporting life after brain injury. In this study we evaluate case management for people with ABI and problems on multiple life domains. Case management aims to prevent (escalation of) problems and to facilitate timely access to appropriate services.
Participants and Methods: 62 adults with ABI and 36 family members with care needs on several life domains were included in this two-year uncontrolled trial. Patients were on average 5.7 (SD 7.7) years after ABI. Case management may contain the following elements depending on the participants needs: engagement, holistic assessment, planning, education, training and skills development, emotional and motivational support, advising, coordination and monitoring. Outcomes for patients include the Hospital Anxiety and Depression Scale (HADS), Utrecht Scale for Evaluation of Rehabilitation-Participation (USER-P) restriction subscale, Life Satisfaction Questionnaire (LiSat), and the Longer-term Unmet Needs after Stroke questionnaire (LUNS). Caregiver outcomes include Carer Self-Efficacy Scale (CSES), Caregiver Strain Index (CSI), LiSat, HADS, and the Family Needs Questionnaire (FNQ). One sample t-tests were applied to test differences between baseline and 12-month outcomes of 35 patients and 23 family members.
Results: Patients and family members reported significantly fewer needs at 12 months compared to baseline (LUNS p=.029 and FNQ p=.041 respectively). Family members reported lower levels of anxiety (HADS p=.003) and higher self-efficacy (CSES) regarding service use (p=.003). Patients showed significantly more participation restrictions after 12 months (USER-P p=.047). Differences on other outcomes were not significant.
Conclusions: Case management seems to be most beneficial for family members, where a reduction in care needs was accompanied by an increase in psychosocial well-being and more feelings of control over the use of care services. It is unclear why this was not the case for patients, but the COVID-19 pandemic and lockdowns likely caused participation restrictions and affected peoples' emotional state. Two-year follow-up will provide insight in potential long-term effects of case management, and a future controlled trial is needed to determine its value compared to usual care.

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03 Long-Term Social Cognition and Behavior Problems After Subarachnoid Hemorrhage and the Effect on Participation

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Objective: Our aim was to investigate to which extent social cognition deficits and self- and proxy-rated behavioral problems, that were assessed in the subacute stage after

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subarachnoid hemorrhage (SAH), persist at the long term. We made a distinction between aneurysmal SAH (aSAH) patients and angiographically negative SAH (anSAH) patients. Additionally, we aimed to find out whether social cognition deficits and self- and proxy-rated behavioral problems in the subacute stage after SAH are related to long-term problems in participation.
Participants and Methods: This longitudinal follow-up study included SAH patients who were admitted to the University Medical Center Groningen. Neuropsychological assessments were performed in the subacute stage (3-6 months) after SAH (T1) and again in the chronic stage (2-4 years) after SAH (T2). Emotion recognition was measured using the Ekman 60-Faces test (FEEST), and Theory of Mind (ToM) was measured using the Cartoon Test and the Faux Pas Test. Behavioral problems were quantified using the Apathy Evaluation Scale (AES) and the Dysexecutive Questionnaire (DEX). Of both questionnaires, both a self-rated and proxy-rated version were used. Finally, the Role Resumption List (RRL) was used to assess changes in amount and quality of work, social relations, leisure activities and mobility.
Results: A total of 59 aSAH and 22 anSAH patients were included in this study. At T1, impairments in emotion recognition were present in 28.8% of aSAH patients and 22.7% of anSAH patients (FEEST total < 42). For ToM, 18.6% of aSAH patients and 18.2% of anSAH patients scored below cut-off (< 14) on the Cartoon test. The Faux Pas score was below cut-off (< 8) for 10.2% of aSAH patients and 9.1% of anSAH patients. At T2, a significant improvement was only found for aSAH patients on the Cartoon test. Regarding behavioral problems, only for anSAH patients we found an increase in problems on both the DEX-self and DEX-proxy at T2. Finally, a lower score on the Faux Pas at T1 was related to more problems in social relations at T2 in the total group of SAH patients. Also, a higher score on the DEX-proxy at T1 was related to more problems in resumption of work and social relations at T2 in the total group of SAH patients.
Conclusions: In conclusion, social cognition deficits after SAH, assessed in the subacute stage, seem to persist over time. Interestingly, although performance on almost all social cognition tests remains stable, anSAH patients and their relatives reported significantly more behavioral problems over time. Nevertheless, aSAH patients still reported more behavioral problems than anSAH patients in both the subacute and chronic stage after SAH. Moreover, this study is the first to find that ToM and proxy-rated behavioral problems in the subacute stage after SAH are related to problems in participation in the chronic stage after SAH. These findings emphasize the need for increased attention for deficits in social cognition and behavior after SAH due to their long-lasting impact on daily life functioning in this patient group.

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04 Effect of Transcranial Direct Current Stimulation (tDCS) in Patients with Disorders of Consciousness

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Objective: Transcranial direct current stimulation (tDCS) applied over the left dorsolateral prefrontal cortex (LDLPFC) has shown to transiently improve the level of consciousness of severely brain-injured patients in disorders of consciousness (DOC). However, no large-sample multicenter study confirmed its efficacy when applied during rehabilitation.
Participants and Methods: In this parallel sham-controlled double-blind randomized trial, we investigated whether 4 weeks of tDCS improve signs of consciousness in patients in prolonged DOC while being in rehabilitation. tDCS was applied over LDLPFC once a day, five days per week for 4 weeks (20 sessions; 20 minutes daily). We used to the Coma Recovery Scale-Revised (CRS-R) weekly and at 1, 2 and 3-months follow-up to objectify behavioral changes. We used a mixed general linear model to evaluate behavioral changes (4-week of tDCS and 3-month follow-up) between active and sham groups, accounting for diagnosis, etiology, and time since injury. Differences between baseline and week-4 and month-3 were analyzed with a Mann-Whitney test. Analyses were conducted at group level and based on the diagnosis and etiology.
Results: 62 patients (18 women, 30 MCS, 39 non-TBI, 37±24.5 week post-injury, 33 active tDCS) were treated without any serious adverse events. At the group level, we did not find any treatment effect after 4 weeks (p=0.19) nor at 3-month (p=0.79). Subgroup analyses revealed a significant improvement for the active compared to the sham group for patients in MCS (p=0.015) and TBI patients (p=0.023) at 3-month. No other comparisons were significant.
Conclusion: Our results suggest that at the group level, tDCS applied during rehabilitation does not significantly enhance patients' signs of consciousness. On the other hand, at 3-month followup, the subgroups of MCS and TBI patients demonstrated a better recovery in the treated compared to the sham groups. tDCS should be specifically applied in this subgroups of patients to promote their recovery.
Funding: This research was partially funded by the program RISE-Marie-Slodowska-Curie of the European Commission (Grant agreement 778234) and by Conselleria de Educación, Investigación, Cultura y Deporte of Generalitat Valenciana (SEJI/2019/017)

Paper Session 24: Neuropsychiatry and cognition

15:30-16:50h
Friday, July 8, 2022

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01 Investigating the Relationship of Brain Age Gaps & Psychiatric Symptoms

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Objective: Amongst psychiatric illnesses, Schizophrenia and Bipolar disorder(BPD) are known for their debilitating effects on cerebral development and cognitive functioning. Both disorders are associated with accelerated aging due to the accumulation of aberrant brain development trajectories. In contrast, Attention-Deficit/Hyperactivity Disorder (ADHD) results in atypical brain maturation as observed in the underdevelopment of certain brain regions. This study aims to first predict the brain age of individuals with Schizophrenia, BPD, and ADHD comorbidities using resting-state functional magnetic resonance imaging (rsfMRI). Thereafter, the brain age gap (BAG: Predicted Age – Actual age) would be calculated and the associations between these BAGs and the three psychiatric syndromes will be examined.
Participants and Methods: rsfMRI data from 560 cognitively healthy individuals in the CAM-CAN study were utilized to train an age-prediction model. Following this, the model was used to predict the brain ages of 122 adults with the aforementioned syndromes. Then, the BAG of the testing dataset was obtained. All 122 adults were scored on each of the components of the Adult ADHD Clinical Diagnostic Scale (ACDS) ADHD symptom scale, Scale for the Assessment of Negative and Positive Symptoms (SAPS & SANS), and Young Mania Rating Scale-C (YMRS). Thereafter linear regression models were fitted to assess the relationships between these symptoms and BAG whilst controlling for Age
Results: The mean BAG was 10.5 years. For the ACDS components, Total Symptoms (β=-1.94, p=0.0118), Total Severity (β=-1.90, p=0.0134), Attention(β=-2.12, p=0.00594) were significantly associated with BAG however Hyperactivity(β=-0.261, p=0.0746), and Impairments (β=-1.52, p=0.05) were marginally associated with BAG. Meanwhile,

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SAPS(β=7.97, p=0.01594), SANS(β=5.78, p=0.03594), were also significantly associated with BAG and YMRS(β=3.22, p=0.0594) showed a marginal association to BAG.
Conclusion: In general, more ADHD symptoms were generally observed to be associated with a smaller BAG. Notably, Attention-deficit related ADHD symptoms were most strongly, and negatively related to BAG. The underdevelopment of frontal brain regions, which are significantly activated during attention-related tasks, may account for such a result. However, SAPS and SANS scores, which are indicative of the severity of Schizophrenia, have been shown to moderate or even override the effects of ADHD symptoms on BAG. SAPS seemed to have a greater impact on BAG compared to SANS. Collectively, Positive Schizophrenia symptoms have been observed to be linked to more significant brain alterations. Thus, greater SAPS scores, suggest higher levels of positive symptoms and possibly greater rates of brain aging. In conclusion, functional brain aging is significant, though differentially, implicated in various psychiatric syndromes. Larger BAGs in both directions (e.g., positive, and negative), adjusted for age, may hint at the presence of psychopathology.
Acknowledgment: I would like to acknowledge the funding support from Nanyang Technological University - URECA Undergraduate Research Programme for this research project.

02 The Effect of Core Cognitive Dysfunction on Memory in People with Mood Disorders

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Objective: Research suggests that 'core' cognitive functions such as processing speed (PS), sustained attention (SA), and executive function (EF) are impaired in people with mood disorders and may play a role in wider cognitive dysfunction in this group. However, the extent to which impairments in these core cognitive functions influence wider cognitive functioning (i.e. the presence of a 'cognitive hierarchy') is not fully understood.
Participants and Methods: We used data from three different mood disorder samples (Bipolar Disorder euthymic [N=63], Bipolar Disorder depressed [N=58], and Major Depressive Disorder depressed [N=44] and matched healthy controls [N=159]) to investigate whether core cognitive dysfunction can explain impairments in verbal memory (VM) and visuo-spatial memory (VS) in patients. Each sample completed a neuropsychological battery and composite scores were created to represent cognitive domains (PS, SA, EF, VM, and VS). Hierarchical regression models were used to investigate the role of PS, SA, and EF, on memory performance in the patient groups, controlling for age and premorbid IQ.
Results: Patients performed worse than controls on all cognitive domains, except depressed patients did not significantly differ from controls on EF. In euthymic Bipolar Disorder, EF and, to some extent, PS, explained the group difference in VM and some of the variance in VS. In depressed groups, EF and SA explained the group difference in memory.
Conclusions: Results suggests the presence of a hierarchy of cognitive impairment in mood disorders, where impairments in EF, PS and SA may lead to poorer performance on tests of memory. The specific core cognitive functions involved appear to vary depending on mood state. The results have implications for our understanding of cognitive impairment in mood disorder groups and, with further research, could inform cognitive therapies. Future research should investigate the effect of using different neuropsychological tests to measure nature of the cognitive hierarchy in mood disorders.

03 Sex differences in cognitive reserve among first episode of psychosis patients

Rebeca Magdaleno Herrero[1,3] , Victor Ortiz-García de la Foz[1,2,3] , Nancy Murillo-García[1,3] , Javier Vázquez-Bourgon[1,2,3] , Esther Setién-Suero[3,4] , Benedicto Crespo-Facorro[2,3,5] , Rosa Ayesa-Arriola[1,2,3]

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Objective: To analyse the differences in CR according to sex in FEP patients and in which cognitive domains these differences are mainly observed.
Participants and Methods: Retrospective work with 599 individuals (156 controls and 443 FEP patients) from the Programa de Atención a Fases Iniciales de Psicosis. An estimated CR was made by using the proxies: premorbid IQ, years of education and employment status. A neurocognitive battery was administered to evaluate the performance on the domains of verbal memory, visual memory, processing speed, working memory, executive functions, motor skills, attention and theory of mind. Analyses of variance was used to make comparisons between groups.
Results: FEP women had higher scores in estimating CR. In the attention domain, it was the FEP men with high CR who obtained the best scores. In the domains of verbal memory and processing speed FEP women with low CR obtained better scores than FEP men with low CR.
Conclusions: These results confirm that FEP women have higher CR than FEP men, which could be related to the later onset of the disease allowing them to complete more years of education. However, the variability in performance observed on verbal memory, processing speed and attention domains is closely linked to sex differences in CR. This information could be relevant to design sex specific cognitive remediation interventions in FEP patients.

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04 Affective and Cognitive Symptoms in Cerebellar Degeneration after Non-alcoholic Wernicke's Encephalopathy

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Objective: In the literature on "alcohol related brain damage" (ARBD) it is speculated that alcoholic cerebellar degeneration (ACD) may lead to a Cerebellar Cognitive Affective Syndrome (CCAS) or that it might contribute to the cognitive and affective symptoms of Korsakoff's syndrome (KS). However, in most published reports there is a co-occurrence of thiamine deficiency and ethanol neurotoxicity as etiological factors, and a co-occurrence of KS and cerebellar degeneration as residual syndromes, which makes it almost impossible to study these causal factors and these residual syndromes in isolation. As a result, three major controversies persist: 1) Is cerebellar degeneration after WE nutritional or alcoholic in origin, or both? 2) Can alcoholic/nutritional cerebellar degeneration (ACD/NCD) lead to cognitive or affective symptoms, or even to a CCAS? 3) Does ACD/NCD contribute to the symptoms of KS? We present a fully documented analysis of the first-ever reported case of a patient with severe cerebellar degeneration without KS, as a result of thiamine deficiency without any involvement of ethanol neurotoxicity.
Participants and Methods: Our patient is a previously healthy woman of 46, diagnosed with mild mental retardation at the age of 8, who contracted COVID-19. Due to incessant vomiting she became malnourished and developed WE in May 2021. In her entire life, she rarely ever consumed any alcohol. MRI scans were made up to a year later. We also administered a full neuropsychological assessment, including Schmahmann's CCAS-scale, and observed her behaviour in a specialized clinical setting during more than 5 months.
Results: In the acute WE phase, she was confused and restless, and suffered from eye movement disorders and a severe ataxia of stance and gait. She recovered quickly after thiamine replacement, but a severe ataxia of stance and gait persisted. On MRI, abnormalities typical of WE were found in the medial thalamus on FLAIR- and T2-sequences. On all MRIs, there was a severe atrophy of the vermis and the anterior lobes of the cerebellum, but no atrophy of the posterior lobes and the hemispheres, which is typical for ACD/NCD. The results of the neuropsychological assessment were within the age, education and

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sex-adjusted normal range for a patient with mild mental retardation. On the CCAS scale, our patient performed somewhat below the cut-off point, but entirely in accordance with her known mild mental retardation. Also, the patient was able to perform instrumental activities of daily living at the level of her premorbid functioning. Therefore, we found no convincing evidence for cognitive decline in our patient.
Conclusions: Our case study provides clear evidence that purely nutritional cerebellar degeneration exists and can be severe. Moreover, it strongly supports the hypothesis that all cases of "ACD" are in reality cases of NCD - where alcoholism provides the context but not the cause. Our case study also presents a strong argument that NCD/ACD, which in all reports is confined to the vermis and the anterior lobe of the cerebellum, does not lead to a CCAS and does not contribute to the cognitive symptoms of KS.

Paper Session 25: Factors influencing developmental disorders outcomes

15:30-16:50h
Friday, July 8, 2022

01 Long-Term Outcomes in Low-Risk Preterm-Born Adolescents and Young Adults

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Objective: Prematurity has been associated with long-term biological, psychological and social consequences. However, studies focusing on long-term outcomes in low-risk preterm populations during adolescence and young adulthood are lacking. The objective of the present study is to describe the possible long-term consequences that can come to occur after preterm birth, specifically in low-risk preterm-born adolescents and young adults. Additionally, it aims to search for the relationship between long-term outcomes in low-risk preterm-born adolescents and young adults and neonatal data after birth as well as early life environmental factors.
Participants and Methods: The sample consisted of 250 participants, 132 of them low-risk preterm [30 to 36 weeks' gestational age (GA)] and 118 full-term individuals (37 to 42 weeks' GA), of both sexes (148 females and 102 males) and aged between 16 and 38 years old. All participants underwent an emotional-behavioral, personality, socioeconomic status, life satisfaction, functionality, resilience, and cognitive assessment.
Results: Different profiles were not found in terms of emotional-behavioral, personality, life satisfaction, functionality, resilience and general cognitive functioning. However, those with a smaller GA obtained lower scores on different cognitive domains (i.e. language skills, processing speed and cognitive flexibility) (Bonferroni corrected *p*-value=.003) and on current socioeconomic status (F=113.47 p<.001) compared to full-term adolescents and young adults. According to correlation analyses, the low-risk preterm group presented statistically significant correlations between general cognitive functioning and parental care (r=.245 p=.005) and overprotection measures (r=-.299 p=.001). Current socioeconomic status was also significantly correlated in low-risk preterm-born adolescents and young adults with parental overprotection measure (r=-.304 p=.001) and childhood socioeconomic status (r=.258 p=.003), while their full-term peers did not presented any correlation with early life environmental factors. No significant correlations with neonatal data have been found with either group (Bonferroni corrected *p*-value=.00625).
Conclusions: Our results suggest that low-risk prematurity has none to mild impact on several long-term outcomes during young adulthood. Being born preterm may lead to a poorer socioeconomic status as well as a worse performance in language skills, processing speed and cognitive flexibility later in life, which seem to be related to parental bonding and childhood socioeconomic status.

02 Impact of Sleep on Attention-Executive Functioning in Children with Neurodevelopmental-Disorders

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Objective: Sleep disturbances affect 40–80% of children with ASD, and up to 70% of children with ADHD report different sleep disturbances. Many studies suggested that poor sleep quality is associated with executive functioning and attention performance deficits. This study aimed to analyze the associations between different sleep quality parameters and performance in attention and executive functions in children with neurodevelopmental disorders (NDDs) and a control group.
Participants and Methods: We report preliminary results of an observational case-control cross-sectional study. Participants (N = 30) include children aged 7-12 years distributed into two groups. Group 1 (*n=20*): children with an NDD (10 children with ADHD and 10 with ASD) without prior pharmacological treatment. Group 2 (*n=10*): control group (typically developed children - TD). Patients were recruited at the Mental Health department of Sant Joan de Déu Barcelona Children's Hospital and related child-adolescent mental health community services. TD-controls were enrolled through the project website and other hospital departments. We used actigraphy recordings (carried by children 10 consecutive days) to evaluate sleep quality, including four indicators of circadian rhythms (body temperature, sleep hours, deep sleep, and motor activity during sleep). Attention and executive functioning were assessed through specific tasks of the NEPSY-II battery designed for child neuropsychological assessment. To evaluate mean differences between groups (NDD-cases and TD-controls) on our outcomes (NEPSY-II), we first made a one-way ANOVA. To examine associations between circadian rhythms/sleep quality and attention/executive functioning in each group, we conducted a Spearman correlation.
Results: When comparing NDD-cases, and TD-controls on our NEPSY-II scores, significant mean differences (<.05) were found on *cognitive flexibility, animal sorting, inhibition-combined, shifting-combined, and clock-subtest (planning)*, with a lower mean score in NDD-cases ($M_{overall}$ = 6.55), than in TD-controls ($M_{overall}$ = 10.01), with highest score differences in the clock-subtest (planning task). When assessing the association between actigraphy recordings and NEPSSY-II scores at the NDD-cases, data showed significant (<.05) positive correlations between *auditory attention* scores and *deep sleep* time and a negative correlation between *inhibition subtest* and *shifting attentions* scores, and *temperature during sleep*. Correlations at the TD-control group showed significant positive correlations between *shifting attention* subtest scores and *deep sleep* time and between *animal sorting* scores and *total hours of sleep*.
Conclusions: Children with an NDD (ADHD and ASD) showed evident clinical difficulties in attention and executive functioning compared with age-matched TD-controls. Several indicators of circadian rhythms and sleep quality showed a significant impact of poorer indicators (e.g., less deep sleep, higher temperature during sleep) on attention and executive functioning, both in cases and in controls, with *shifting attention* subtest being affected in both groups. Our findings are preliminary data but show consistency with previous research. Sleep disturbances have been reported as a critical clinical feature affecting especially children with ADHD and ASD. At the same time, other studies show a direct impact of these disturbances on attention and executive functioning in children. Further research is needed to better understand the common interplay between sleep disturbances and attention/executive functioning in children with an NDD.

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03 Improving Adaptive Skills of College Students Diagnosed with Autism Spectrum Disorder

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Despite inclusion efforts in higher education in recent years, a growing commitment to educational equity among historically underserved students is required. There is limited support for persistence and graduation of college students diagnosed with a learning disability. Herbert et al. (2014) suggested that learning disabilities such as autism are one group that should be supported. A more

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systematic, culturally sensitive approach is essential to connect the educational gaps. There is limited research on successful interventions for underrepresented college students with autism. Behavior Skills Training (BST) is a method to teach students, staff, parents, and anyone else a new skill. BST is "a procedure consisting of instruction, modeling, behavioral rehearsal, and feedback that is used to teach new behaviors or skills" (2004, p. 558). This project utilizes behavior skills training, modeling, rehearsing, feedback to teach college students Diagnosed with Autism selected skills including job interviewing skills and daily living. A workshop carried out by applying probe and post intervention assessment to measure participants learning outcomes. Seven out of the eight students showed an increase of overall scores for job Interview skills. All learners showed an increase in daily living scores on post intervention analysis.

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04 Language Development in Early-ASD: A new use of the CDIs

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Objective: Children with an Autism Spectrum Disorder (ASD) are at high risk of having concomitant language disorders (Ozonoff et al., 2014). The Bayley Scales of Infant Development (BAYLEY-III) has been postulated as the number one clinical and research choice for early neurodevelopment assessment (Anderson & Burnett, 2017). The MacArthur Communicative Development Inventories (CDIs) are among the most widely used parent-report language measurement (Fenson et al., 1993) and a common tool to measure early language development in autism clinical trials. This report aims to suggest a new methodological use of the CDIs to provide a better language characterization in severely affected clinical populations (e.g., ASD) and facilitate a more sensitive measurement to capture language improvement at clinical trials.
Participants and Methods: Participants included 16 toddlers (age $M = 25.13$, $SD = 3.69$) referred from early intervention community services at risk for ASD. All participants got an ASD diagnose and were enrolled at a naturalistic parent-mediated clinical trial for ASD in early ages, at Sant Joan de Déu Barcelona Children's Hospital, as part of the *TEA CARE-Mas Casadevall* project. The study protocol included a full basal neurodevelopmental assessment (BAYLEY-III), including language characterization (CDIs), and ASD symptomatology coded through the Autism Diagnostic Observation Schedule (ADOS-2) Toddler Module. When we used the clinical procedure of the CDIs administration, we got a floor effect, providing minor clinical data of our sample language profile. This result led us to explore other use of the CDIs' data. To better capture our participants' pre-verbal communication skills, we administered the full CDIs protocol (items 8-30 months) regardless of age criteria, calculated a total direct raw data summative, and divided it by the total item administered, getting a *communication skill acquisition percentage index*. To empirically test this data approach, we compared correlation data of the CDIs age-based percentiles and our CDIs full-protocol raw-data percentages, associated both scores primarily with the BAYLEY-III language scales.
Results: Our participants showed a moderate to severe autism symptomatology (ADOS-2; $M = 19.63$, $SD = 2.85$), and all children showed significant developmental language delay (BAYLEY-III Language composite score; $M = 55.44$, $SD = 7.28$, and CDIs overall percentiles below 5, with a Standard Deviation below 3). Additionally, 56% in cognitive and 44% in motor composite scores did not reach the BAYLEY-III normal-range developmental cut-off. When assessing the association between the CDIs overall standardized percentiles and other clinical data (i.e., ADOS-2 and BAYLEY-III language scales), results showed a non-significant (>.05) association. In contrast, when we assessed our CDIs full-protocol raw-data acquisition percentage, data showed significant (<.05) correlation with both the ADOS-2 scores (negative) and with the BAYLEY-III language composite scores (positive).
Conclusions: Toddlers with ASD are at increased risk of presenting a developmental language delay that might not be well captured by the standardized administration and scoring of the CDIs. Administrating a full CDIs protocol and using suggested raw scores provides a better pre-verbal communicative skills acquisition

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profile and might help get a more sensitive measure of change when assessing treatment response in early language development.

Paper Session 26: Movement Disorders and dementia

15:30-16:50h
Friday, July 8, 2022

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01 Pilot phase of the vCare "Virtual Coaching Activities for Rehabilitation in Elderly" in Parkinson´s disease

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Objective: To evaluate the Pilot phase from the European Project vCare (*Virtual Coaching Activities for Rehabilitation in Elderly*), and the usability and satisfaction level with vCare system in patients with Parkinson's disease (PD).
Participants and Methods: Twenty PD patients will be randomized to the intervention group (10 patients) or the control group (10 patients) in order to assess the vCare rehabilitation system. The vCare is a virtual coach that involves the user in physical and cognitive rehabilitation, as well as a daily life monitoring system. The vCare system will be installed at the house of 10 patients. The monitoring and intervention will last 12 weeks, monitoring the PD motor symptoms with the STAT-ON during the first and last week of the virtual intervention. The general cognitive evaluation, quality of life, system satisfaction and usability, activities of daily living, and motor status will be assessed pre-post intervention.
Results: Patients will interact with vCare virtual system for daily life monitoring and cognitive and motor rehabilitation. The intervention group of patients will perform the home-based motor activities, home-based cognitive activities, coaching for an active lifestyle, e-learning activities, and falls prevention activities. Usability of the system and quality of life will be assessed. PD patients will interact with the vCare Avatar following personalized monitoring and cognitive and motor intervention during the 12 weeks.
Conclusions: vCare system will be able to perform daily life monitoring with presence and movement devices installed in the patient's home, establishing a personalized rehabilitation for each patient. The virtual coach will promote a healthy lifestyle and will be able to prevent hazards and detect patients at fall risk.

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02 Dementia Rating Scale-2: Three-Year Follow-up of Surgical and Non-Surgical Parkinson's Disease Patients

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Objective: To explore the cognitive trajectory of Parkinson's disease (PD) patients with and without deep brain stimulation of the subthalamic nucleus (STN-DBS), in a three-year follow-up.
Participants and Methods: 108 PD patients completed the Dementia Rating Scale-2 (DRS-2) twice with approximately 3-year interval; 46 of them underwent STN-DBS following the first assessment (63% men; medians: age=56, education=4, age at disease onset=45, disease duration=11, levodopa equivalent dose-LED=1620mg; UPDRS-III Off=40 and On=16; interval between assessments=39 months) and 62 did not undergo surgical treatment (60% men; median: age=68, education=4, age at disease onset=61, disease duration=6, LED=710mg; UPDRS-III Off=32 and On=19; interval between assessments=36 months). DRS-2 scores were adjusted for age and education according to regression-based norms. Non-parametric tests were applied for group comparisons (Chi-square and Mann-Whitney) and test-retest analyses (Wilcoxon). Linear regressions fitted with generalized estimating equations (GEE) were performed to verify the effects of time and group on DRS-2, adjusting for age, UPDRS-III OFF, and interval between assessments.
Results: STN-DBS patients had earlier disease onset and longer disease duration (both $p<0.001$). At baseline, STN-DBS patients were younger and had higher UPDRS-III OFF scores and LED (all $p<0.001$), whereas UPDRS-III ON scores was less severe ($p=0.017$) than the non-surgical group. No significant group difference was found regarding sex or education ($p>0.05$). STN-DBS patients had better baseline DRS-2 Conceptualization (medians: 0 vs. -0.3, $p=0.037$), whereas Total scale (medians: -0.5 vs. -0.6, $p=0.196$) and subscales Attention (medians: -0.3 vs. -0.3, $p=0.946$), Initiation/Perseveration (medians: -0.3 vs. -0.4, $p=0.395$), Construction (medians: 0 vs. -0.7, $p=0.162$), and Memory (medians: -0.1 vs. 0, $p=0.857$) were not different between groups. At follow-up, STN-DBS patients had better scores on Total scale (medians: -0.5 vs. -1.3, $p=0.050$) and subscales Attention (medians: -0.4 vs. -1.3, $p=0.006$), Conceptualization (medians: 0.2 vs. -0.5, $p=0.004$), and Memory (medians: 0 vs. –0.6, $p=0.031$); no significant difference was found regarding Initiation/Perseveration (medians: -0.5 vs. -0.7, $p=0.993$) and Construction (medians: -0.3 vs. -0.6, $p=0.458$). In the STN-DBS group, Initiation/Perseveration ($p=0.046$) was the only DRS-2 score that significantly declined at follow-up. Non-surgical group's Total scale ($p<0.001$) and Attention ($p=0.002$), Conceptualization ($p=0.002$), and Memory ($p<0.001$) subscales significantly declined at follow-up. GEE models revealed significant interactions between time and group on Attention ($p=0.004$) and Memory ($p=0.023$) subscales. There were also significant effects of time and group on Total scale (respectively $p<0.001$ and $p=0.028$) and effects of time on Initiation/Perseveration ($p<0.001$) and Conceptualization ($p=0.004$) subscales. No significant effects of time or group were found on Construction subscale ($p>0.05$).
Conclusions: DRS-2 scores (adjusted to the demographic characteristics) prior to STN-DBS were not, for the most part, different from a non-surgical PD group. In a three-year follow-up, STN-DBS patients only significantly declined on Initiation/Perseveration subscale, whereas the non-surgical group showed an overall cognitive decline. The diverging trajectories were most evident on Attention and Memory subscales, even when age and severity of motor symptoms were taken into consideration. The basis for these differences is unclear. Nevertheless, study findings confirm that STN-DBS is relatively safe for cognition when proper standards are used in the presurgical selection process.

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03 Sleep disorder in patients with Parkinson's Diseases underwent to NST-DBS

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Objective: To study the quality and quantity of sleep in patients with Parkinson disease (PD). Through the Parkinson's Disease Sleep Scale (PDSS) studied the performance before, at 3 and 6 months after bilateral deep brain stimulation of the subthalamic nucleus (STN-DBS).
Participants and Methods: We study 115 PD patients who underwent STN-DBS (61,50+/-

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7,237 years at the DBS; 1,53+/-4,698 time evolution). Fifteen patients were excluded due to surgery complications and nine for having unilateral DBS. Using the criteria our total is 91 participants, 62'6% (57) male. All patients were assessed before STN-DBS, and three and six months after surgery. Inclusion criteria were: (a) idiopathic PD (b) STN- DBS performed in SPH (Sant Pau Hospital), (c) preserved cognition. Exclusion criteria were (a) moderate-severe cognitive impairment before the surgery, controlled by validated neuropsychology tests, (b) atypical parkinsonism (c) severe psychiatric disorder, (d) unilateral interventions

Results: Performance of PDSS three and six months after STN-DBS was significantly higher for total score (F=12,21; p=<0.001; pre<3 months; pre<6 months), overall quality of night's sleep (F=7,878; p=0.001; pre<3 months; pre<6 months), sleep onset and maintenance insomnia (F=8,603; p=0,001; pre<3 months; pre<6 months), nocturnal restlessness (F=12,867; p=<0.001; pre<3 months; pre<6 months), and nocturnal motor symptoms (F=8,947; p=<0.001; pre<3 months; pre<6 months). When comparing performance between three and six months any significant differences were observed. In the other hand, wasn't found significant difference for nocturnal psychosis (F=2,441; p=0.099); nocturia (F=2,742; p=0,70); sleep refreshment (F=1,732; p=0,185) and daytime dozing (F=0,779; p=0,456).

Conclusion: STN-DBS is a safe and effective technique to improve sleep disorders on the PD at least six months after surgery. Our results agree with Iranzo et al., (2002) that exposes that sleep symptoms and nocturnal mobility improved six months after STN-DBS when compared with basal performance. This benefit in sleep quality might be explained for several reasons, including gamelioration in nocturna mobility and second for reduction in dopaminergic drugs treatment.

Own results show that at three months post DBS significant differences in sleep performance already appear. This performance increment was maintained for the next three months. For future research we recommend keep studying performance of sleep disorders after a long period of time.

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04 Differences in Visual-Cognition Between Asymptomatic and Symptomatic Carriers of Huntington's Disease

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Objective: This study aims to analyze the visual cognition profile of asymptomatic and symptomatic carriers of Huntington's disease (HD), compared with healthy controls (HC), and to evaluate the differences between asymptomatic and symptomatic patients with different years of progression of HD.

Participants and Methods: We evaluated 143 participants, 77 HD carriers [32 asymptomatic, 19 symptomatic (<5 years of evolution), 26 symptomatic (>5 years of evolution)] and 66 HC matched by sex and educational level. Motor function was rated with UHDRS scale, the general cognitive status was assessed with MoCA test, and we included a comprehensive battery of visual cognitive instruments to assess the following visual cognitive domains: visual memory, visuospatial skills and visuoconstructive abilities. One- way ANOVA and Tukey's test for post hoc analysis were performed to analyze and compare the cognitive performance between the four groups.

Results: Significant differences were found between groups, both in the motor function ($F(5.1)=54.094$; $p<.001$) and in the general cognitive status ($F(5.1)=20.218$; $p<.001$). Specifically, we found significant differences in visual memory and visuospatial and visuoconstructive abilities between asymptomatic and both symptomatic subgroups of HD patients ($p=.046$), and also between the two groups of symptomatic patients with different years of evolution of HD ($p=.017$).

Conclusions: Findings suggest that both symptomatic and asymptomatic HD patients present an increased visual cognitive impairment compared to HC in all the evaluated domains. Results show increased visual

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cognitive deterioration and motor impairment in HD patients related to disease progression.

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05 Structural Brain Differences Between Lewy Body Diseases Subtypes Based on Nonmotor Symptoms

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Objective: The main goal of this study was to investigate Lewy body diseases (LBD) subtypes using hierarchical clustering approach based on nonmotor data, and to explore structural MRI brain differences between the clusters identified. **Participants and Methods:** Sixty-two LBD patients (n=6 E46K-SNCA, n=8 dementia with Lewy bodies and n=48 idiopathic Parkinson's disease) and 37 normal controls were assessed with an extensive nonmotor evaluation. PD-related features assessing with Hoehn & Yahr Stage and Unified Parkinson's Disease Rating Scale were also recorded in the LBD sample. Hierarchical cluster analysis (HCA) was performed with the LBD sample based on nonmotor data and according to Random Forest Classifier. T1-weighted and diffusion-weighted MRI data was acquired using a 3T MRI scanner. Whole-brain comparisons of gray matter (GM) and white matter (WM) analyses were performed using the FMRIB Software Library (FSL) with a randomized tool (5000 permutations) and with threshold-free cluster enhancement (TFCE) methodology. Statistical threshold for analysis was set at $p < .05$ corrected for multiple comparisons using family wise error (FWE). Demographical, nonmotor and PD-related features' differences between clusters were also explored. **Results:** HCA revealed two LBD subtypes, mild-subtype (n=29) and severe-subtype (n=33). Severe-subtype was severely affected in motor and nonmotor domains with marked cognitive, visual and bradykinesia alterations, and showed occipital, parietal temporal and frontal GM and WM alterations. However, mild-subtype was slightly affected in some nonmotor domains (fatigue, depression, olfaction and orthostatic hypotension) without detectable cognitive impairment compared to normal controls. This subtype also showed occipital GM mild disruptions compared to normal controls. **Conclusions:** These findings add recent evidence regarding different phenotypes in LBDs, which differ in specific patterns of clinical symptoms and structural brain degeneration.

Coffee Break

17:00-17:30h
Friday, July 8, 2022

Poster Session 05

17:00-17:30h
Friday, July 8, 2022

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01 The Role of Different Cognitive Reserve Proxies in Cognitive Functioning Across the Adult Lifespan

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Objective: Cognitive reserve (CR) refers to our ability to compensate for the adverse effects of neuropathology on cognitive functioning. CR is a dynamic construct that is assumed to develop over the adult lifespan, and is commonly assessed via proxy indicators. Education is the most commonly used proxy measure for CR, but other proxies such as intelligence estimates, and occupational and leisure activities, independently contribute to CR as well. However, the dynamic nature of CR is at odds with some of these proxy measures, such as educational attainment and estimated IQ, as they are assumed to remain relatively stable across the adult lifespan. For other proxies, such as

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occupational activities, development over the adult lifespan, and thereby an increasing influence on cognitive performance, is more likely. The goal of this study is to elucidate how different CR proxies relate to cognition as a function of age, by exploring their relationship in a healthy adult sample aged 18-79 years.
Participants and Methods: A total of 352 cognitively healthy adults (M_{age} = 48.1, SD = 17.1) were included. Participants completed a neuropsychological examination to measure those functions most sensitive to aging, namely episodic memory, executive functioning and psychomotor speed. These measures were unified into one cognitive function construct. CR was assessed with the Cognitive Reserve Index questionnaire, which measures education, occupation and leisure activities. In addition, an IQ estimate was obtained using the National Adult Reading Test. We created age groups (<30, 30-49, 50-64, 65+) and used the youngest age group as reference group, as associations in this group likely reflect main effects of intelligence/educational attainment. Hence, we looked for associations that were different in the older age groups (≥30 years of age) compared to the reference group (<30 years of age).
Results: In the reference group (<30 years of age), only estimated IQ was significantly related with cognition. This association was similarly present in the other age groups. In addition, cognition was significantly related with education in the 30-49 age group, with occupation and leisure-time activities in the 50-64 age group, and occupation in the 65+ age group. Additional linear regression analyses in these older age groups (30-49, 50-64, 65+) showed that, whereas estimated IQ was the only significant predictor of cognition in the 30-49 age group, leisure activities together with estimated IQ predicted cognition in the 50-65 age group, and occupational activities with estimated IQ predicted cognition in the 65+ age group.
Conclusions: CR proxies differentially related to cognition across the adult lifespan. A stable association between estimated IQ and cognition across the adult lifespan suggests that IQ does not reflect the accumulative nature of CR, challenging the notion that IQ is a sufficient proxy measure of CR as defined in the literature. For leisure activities and occupation, associations with cognition become evident at an advancing age, suggesting that these proxies may better reflect dynamic CR over the lifespan than estimated IQ and educational attainment.

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02 Implicit Sequence Learning in Elderly - Measured by an Oculomotor Activated Serial Reaction Time Task (O-SRT)

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Objectives: There is considerable consensus in the literature that declarative learning declines with age. However, findings about implicit sequence learning (ISL) in the elderly are thus far inconsistent. One possible explanatory factor for this inconsistency might be manual motor skill, considering that aging is also associated with a decline in this ability. A hallmark task to study ISL is the Serial Reaction Time (SRT) task, which is typically based on manual motor response. We aimed to bypass the manual motor component by using an eye-tracked version of the SRT with oculomotor-activated response (O-SRT) to study ISL in the elderly. In addition to reaction time (RT), the O-SRT allows the measurement of anticipations. Furthermore, we evaluated how working memory capacity, explicit sequence awareness and sequence knowledge are related to ISL in the elderly.
Participants and Methods: Twenty-five elderly adults and 31 young adults were tested on the O-SRT containing an original sequence in the first six blocks (1-6), followed by the interference block (7) with a different sequence, which was then followed by the recovery block (8) containing the same sequence as in blocks 1-6. Participants were instructed to look at the target - a dot appearing in one of four squares - until it disappeared. The slides were oculomotor activated. Eye movements were recorded by an SMI RED-M eye-tracker (120Hz). Digit and spatial spans were assessed. Sequence awareness was evaluated via a questionnaire, and sequence knowledge measured by a sequence recognition and reproduction task.
Results: RT and Correct Anticipations (CA) of the three phases of ISL were analyzed separately: Learning (blocks 1 to 6), Interference (block 6 vs. block 7) and Recovery from Interference (block 7 vs. block 8). Although there was a decrease in RT over the first three Learning blocks, all analyses revealed that the elderly at group level did not learn the sequence (no effect of Learning, Interference nor Recovery from Interference). Whereas higher sequence awareness supported the young adults group (reduction of RT during Learning), it had a negative effect on the elderly (reduced the increase of CA during Learning). Sequence knowledge was positively related to ISL measures in young adults but not in the elderly. There were no group differences in sequence awareness, but the elderly had lower scores on

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sequence knowledge measures, which for the elderly were also below chance level. In both groups, neither digit nor spatial span measures were related to ISL.
Conclusions: Our findings show that despite elimination of the manual motor component, the elderly did not learn the sequence either implicitly or explicitly. Hence, their impaired performance is not related to manual motor skills and does not explain the inconsistency in the literature. However, our observation that sequence awareness reduced ISL might point to another factor. The elderly might hesitate the more they are aware of the sequence, and therefore might flow less freely with the task performance. This behavior may lead to reduced ISL and is worth studying in future research.

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03 Physical Activity During Midlife: Associations with Brain, Mental and Cognitive Health

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Objective: We explored whether and how the change in physical activity (PA) status during midlife is related to brain integrity, Alzheimer's disease (AD)-related pathology, mental health, and cognitive functioning in a cohort of individuals at increased risk of developing AD.
Participants and Methods: We included 273 cognitively unimpaired adults from the ALFA+ (ALzheimer and FAmilies) study. Participants were administered a questionnaire investigating the minutes of PA per week at baseline and after a follow-up of 4.1 (±0.8) years. Participants were classified in PA groups based on their activity level at the two time points (active≥150 minutes/week, inactive<150 minutes/week): (1) maintained-PA groups: active/active (N=33) *vs.* inactive/inactive (N=140), and changing-PA groups: inactive/active (N=64) *vs.* active/inactive (N=36). At follow-up, 218 participants underwent [^{18}F] flutemetamol positron emission tomography to measure brain amyloid-beta burden and 148 underwent structural magnetic resonance imaging to measure volume and cortical thickness in medial temporal lobe structures. Additionally, participants completed the Hospital Anxiety and Depression Scale (HADS) as a measurement of total anxiety/depression level and the Memory Binding Test (MBT) as a measurement of memory performance. First, we conducted separate multiple regression analyses with PA groups as independent and brain integrity, amyloid-beta burden, mental health and memory measures as dependent variables. In a second step, we performed stratified analysis within each PA group, and investigated the cross-sectional associations between the brain, mental health and memory measures within the groups. All models were controlled for age, sex, years of education, *APOE-ε4* status and inter-individual time difference between baseline and follow-up assessments.
Results: Participants were aged between 48-71 years, 59% were women. Mean HADS score was 6.8 (±0.8), MBT/Free delayed recall score was 17.8 (±5.4) and change in minutes of PA from baseline to follow-up was 23.9 (±173.6), respectively. Being inactive/inactive was associated with higher HADS scores (p=0.007). Further, higher anxiety/depression scores in the inactive/inactive group showed a cross-sectional association with lower MBT/Free delayed recall scores (p=0.048). Being active/inactive was associated with higher brain amyloid-beta burden (p=0.013) which was in turn cross-sectionally associated with lower cortical thickness in medial temporal lobe structures (p=0.021) and lower hippocampal volume (p=0.007) in this group. Active/active or inactive/active groups did not show any significant association with any of the measurements investigated.
Conclusions: Our findings suggest that middle-aged adults staying physically inactive or becoming inactive could have greater levels of anxiety/depression and amyloid pathology. Moreover, worse mental health and pathology outcomes in these individuals may eventually predict worse memory performance and lower brain integrity.

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04 Association Between Resilience To Stress In The Elderly People And Performance In

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Iadl

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Introduction: The increase in the elderly population sector and the progressive loss of independence in the performance of instrumental activities of daily living (IADL) represent one of the great current socioeconomic challenges. To address this challenge, many studies focus on discovering which factors mediate or moderate the association between the cognitive status of the elderly people and their performance in the IADL. Studies indicate that stress may be a variable of interest in such an association. However, stress is a complex construct with different facets, and we have very little evidence of its role in the cognition-IADL´s relationship.
Objective: To determine the relationship of the performance of cognitively healthy elderly people in a
validated task to measure IADL and different aspects of stress such as resilience, current subjective experience, and the amount and effects produced by life events considered universal
stressors.
Participants and Methods:
Sample: 65 elderly (71% women), with a mean age of 76.48 (SD=8.44) and a mean MMSE score of 27.40 (SD=2.65). Instruments: the UPSA (UCSD Performance-Based Skills Assessment; Patterson et al., 2001), the EAE-A (Scale of Stressful Events in the Elderly; Fernández Seara & Mielgo Robles, 1996), the CD-RISC (Resilience Scale; Connor & Davidson, 2003) and the PSS-14 (Perceived Stress Scale; Cohen et al., 1983).
Analysis: Hierarchical linear regression with the UPSA total score as dependent variable and the following blocks as factors: 1) age and years of schooling, 2) CD-RISC overall score, 3) PSS-14 overall score, 4) EAE-A amount of lifetime stressful events, 5) EAE-A score of current distress due to stressful events.
Results: The full regression model predicted 44% of the explained variance of the UPSA score ($p < .001$). The age and schooling block explained the 33% ($p < .001$). Resilience score of the CD-RISC predicted 7% of the variance ($p = .009$). The increase in variance explained by each of the other blocks was not significant, with the contribution of distress due to stressful life events being the closest to significance ($p = .097$). The highest value of the standardized coefficient was resilience ($\beta = .316$).
Conclusions: After controlling for the effects of age and schooling, the greater the resilience to stress of the elderly, the better the performance on the IADL, indicative of greater autonomy). This finding opens the possibility to study the hypothesis of whether adequate stress coping capacity could exert a protective role on cognition and thus have an autonomy-preserving effect on IADL in older people. This finding could have socioeconomic and well-being implications through programs to promote stress resilience.

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05 Factors influencing mobile phone use in older adults

Araceli Revollo Sarmiento[1] , Leticia Vivas[1] , Deisy Krzemien[1]

[1]IPSIBAT (CONICET/UNMDP)

Introduction: Currently, the use of technologies has become more relevant due to the COVID-19 pandemic, so the study of factors that facilitate and difficult the use of apps in mobile phones is necessary. Recent works indicate that there would be an association between the cognitive reserve (CR) of older adults and access to digital life, including mobile phones. Other researches analyze the influence of the use of apps (particularly social networks) on cognitive functioning (Quinn et al., 2018), as well as the use and acceptance of mobile phones in old age (Scullin et al., 2021). However, there are still few studies that have analyzed the relationship between cognitive functioning, cognitive reserve, functionality and the use of mobile phones.
Objective: To study the effect of RC, cognitive functioning and complex functionality variables in relation to behavioral measures using mobile phones in older people.
Participants and Methods: Sample: 41 older people, between 60 and 90 years of age. Instruments: The ACE III (Bruno et al., 2017), the cognitive reserve questionnaire (Rami et al., 2011) and the Questionnaire of complex functionality (Labos et al., 2018) were implemented. Subsequently, the usage behavior questionnaire was adapted to Argentina (Ma et al., 2016). The questionnaires and the informed consent were taken virtually due to the pandemic context.
Results: Linear regression analyses were performed in usage behavior variables: years of use, installed apps, apps used and cost.

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An ordinal regression analysis was performed with the variable to frequency of use because it was ordinal with three values. The independent variables were: RC, cognitive functioning, complex functionality. Significant associations were observer between years of use and RC ($p<.001$; $t=4.441$), the installed apps and the RC ($p<.01$; $t=2.817$), the cost and the RC ($p<.001$; $t=4.481$) and frequency of use and change in complex functionality ($p<.05$; estimator=4,621). None of the 3 variables of interest were shown to have an effect on the numbers of apps that participants used.
Conclusions: The results showed that at higher value of RC the use of the mobile phone is also higher. It is likely that this relationship is mediated by the economical condition. Some papers theorize that the economic status allows the access to resources or possibilities to obtain a higher RC (Garcia et al., 2020). People that have greater cognitive reserve tend to have higher education and greater ability to access recreational and training activities. Therefore, people would have more access to resources and can buy mobile phone and pay the service. Meanwhile, it is expected that with the loss of complex functionality, which implies the use of technological devices, the use of mobile phones will also decre

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06 Expanding Retrieval Practice Boost Episodic Memory in Individuals with Amnestic Mild Cognitive Impairment

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Objective: Expanding retrieval practice, as a way of spaced schedule through the first retrieval after initial acquisition and following gradually increasing delays, may best suit normal to pathological aging to avoid a floor effect on episodic memory and promote their retention. This study aimed to investigate whether retention of detailed (verbatim) and gist information about episodic memory could be evenly improved by expanding the retrieval schedule in people with amnesic mild cognitive impairment (aMCI) compared to older adults (OA).
Participants and Methods: The study consists of 24 people with aMCI and 28 cognitively unimpaired older adults. All participants completed multiple neuropsychological tests. They also performed free recall for verbal episodic events in conversations containing detail and gist information consisting of a study, immediate memory, retrieval practice with five attempts, and test phases.
Results: The results revealed that the aMCI group, but not the OA group, demonstrated remarkable benefits from repeated retrieval practice in subsequent memory performance of gist and detail information and performed similarly relative to the OA groups. The results showed similar improvements between the details and gist information when repeated retrieval practice was used in either the MCI or OA group.
Conclusions: Overall, our findings suggest that a robust improvement in episodic memory through retrieval practice may shed light on the clinical implications for cognitive rehabilitation in pathological aging.

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07 The Influence of Drawing on Memory Formation: A Lesion-Based Approach

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Objective: The hippocampus plays a critical role in the formation of declarative memories. As such, persons with focal damage to the hippocampus show significant impairments in new memory formation. Drawing, a form of multi-modal encoding, improves declarative memory performance relative to other multimodal encoding strategies such as writing. This benefit likely accrues from the engagement of non-hippocampally mediated processes including the integration of motor, visual and verbal information, enabling more elaborative

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encoding. However, drawing has not been directly tested as an encoding strategy for persons with hippocampal damage. To address this gap, we examined whether persons with hippocampal lesions could benefit from the mnemonic strategy of drawing.
Participants and Methods: Three patients with focal hippocampal damage and one patient with both hippocampal and cortical lesions in the anterior and lateral temporal cortex participated in this case series study. Their performance was compared to 22 age and sex-matched controls. At encoding, all participants were shown a list of words and received interspersed instructions to either draw a picture of the word or repeatedly write the word for 40 seconds. Following a brief filled delay, free recall and recognition memory for words in both encoding conditions was assessed.
Results: Both patients and controls showed enhanced memory for drawn compared to written words. The size of the drawing effect (the difference in the proportion of drawn versus written recalled words) did not differ between patients and controls during free recall. However, this drawing effect was limited to the three hippocampal-only lesion patients. The patient with both hippocampal and cortical lesions (in anterior and lateral temporal lobes) did not show a drawing benefit, with poor recall observed for all stimuli irrespective of encoding condition. During recognition, patients correctly recognized a higher proportion of drawn versus written words. As with free recall, the size of the drawing effect did not differ between the patients and controls. Both the patients with hippocampal-only and hippocampal and cortical lesions displayed increased recognition memory for the drawn words than the written words.
Conclusions: These findings demonstrate that drawing is an effective encoding strategy and offers a promising new avenue to improve memory functioning in hippocampal lesion patients. While preliminary, these data also suggest that cortical involvement may be necessary to realize the drawing benefit. Declarative memory relies on interactions between hippocampal and lateral temporal neocortical regions. When both systems are compromised the benefit of multi-modal encoding strategies we observed here may be attenuated. Future research will be necessary to replicate these early findings on the drawing effect in hippocampal lesion patients, and further specify the neural mechanisms that support such multimodal encoding strategies.

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08 Differential Effect of Executive Function on the Memory Binding Test and Logical Memory in Healthy Cognition

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Objectives: Previous research has found a consistent association between executive function (EF) and memory performance. However, such relationship is heterogeneous, probably because different memory tasks may imply more or less involvement of EF. Previous studies using the California Verbal Learning Test (CVLT) and Logical Memory (LM), found that neurological patients with significant executive dysfunction performed worse in the CVLT, but not in the LM, than those with minimal executive dysfunction. We hypothesize that more intentionally organized word list tasks with a more structured presentation of the items will lead to different results. The present study aimed to investigate the impact of EF on LM and the Memory Binding Test (MBT), which uses a highly controlled process of learning, in cognitively healthy individuals.
Participants and Methods: The study included 412 cognitively unimpaired participants (mean[SD] age:61.1[4.7] y.o., mean[SD] education:13.5(3.5) years; 60.2% females) from the ongoing ALFA+ cohort. We analyzed the WMS-IV Logical Memory immediate recall (LM-IR) and the MBT immediate free recall (TFR). The MBT consists in the learning and recall of two lists of 16 words each, pertaining to 16 different semantic categories, that are presented printed in sets of four. Examinees should read aloud each word and identify them when a semantic category is given. After learning, an immediate cued recall and a consecutive free recall trial are performed. In the LM, two stories with 25 elements each are aurally presented, and the examinee should repeat as much of them as possible immediately

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after presentation. As EF measure, we computed a composite score averaging the z-scores of TMT-B, WAIS-IV Coding and Matrix reasoning, and NIH-toolbox Flanker Inhibition Test. We constructed linear models with LM and MBT scores as dependent variables, EF composite as predictor, and gender, age and education as covariates. Additional models using a binary EF grouping as predictor (low EF [z<-1,n=46] vs average/high EF [z>-1,n=366]) were explored.
Results: The continuous EF measure was significantly associated to both MBT-TFR [$F(1,407)=10.7$, $p=0.001$, $\eta_p^2= 0.026$] and LM-IR [$F(1,407)=27.4$, $p<0.0001$, $\eta_p^2= 0.063$]. Although the effect size (η_p^2) was higher for the LM-IR, the 95% CI of the coefficients (standardized) overlapped [LM-IR (B=0.379; 95% CI [0.237, 0.521]); MBT-TFR (B=0.231; 95% CI [0.092, 0.369])], indicating no significant difference. The analyses using low vs average/high EF groups as predictor, showed an association to LM-IR [$F(1,407)=10.9$, $p=0.001$, $\eta_p^2= 0.026$] but not to MBT-TFR [$F(1,407)=2.1$, $p=0.152$, $\eta_p^2= 0.005$].
Conclusions: Our results suggest that EF exerts a stronger effect in less organized memory measures, such as paragraph recall, than in word-list tasks when there is a controlled learning process. This result contrasts with previous findings with other word lists with less controlled learning (CVLT). Thus, EF performance and the nature of the memory tasks administered should be taken into account when interpreting memory scores. The present findings, observed in cognitively healthy individuals, may be more relevant in patients with impaired executive abilities, even with mild EF alterations.

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09 Memory and Stress: Findings in Normal-Weight Population

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Objective: At any age, stress situations trigger psychological and physiological responses that are originally meant to be adaptative – e.g., overeating after a stressful event to replenish energy reserves or the engagement of sympathetic systems in fight-or-flight responses – but can be harmful in the long-term (i.e., overweight/obesity, hypertension or higher cardiovascular risk, among others)[1]. Stress exposure also interferes with cognition, especially in memory function, since it has a direct impact on the hippocampus and the amygdala. However, literature reports mixed findings[2]. Given this, we assessed whether the associations between memory and psychological/physiological stress were consistent among participants with different body mass index and age.
Participants and Methods: 113 adolescents (55 females; mean age: 14.96 ± 2; age range: 11 – 19) and 146 adults (89 females; mean age: 32.22 ± 7.6; age range: 20 – 49) underwent a medical and neuropsychological evaluation. None of them presented medical, neurological nor psychiatric comorbidities. In both age groups (adolescents and adults), two subgroups were defined according to their body mass index (BMI): normal-weight (NW) and overweight/obesity (OW/OB).
Immediate and delayed memory were assessed using the immediate and delayed free recall of the California Verbal Learning Test. Psychological stress was evaluated using the anxiety score of the Hospital Anxiety and Depression Scale (HADS), whereas physiological stress was evaluated using plasma cortisol, systolic and diastolic blood pressure (SBP and DBP, respectively, which may also reflect greater cardiovascular risk). Cortisol was transformed to its logarithmic form prior to any analyses.
Separated by age group (adolescent or adult) and BMI group (NW or OW/OB), Pearson correlations were performed between memory and stress variables. Next, controlling by age group, BMI group and sex, we fitted multiple

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regression models to further assess the relationship between memory and stress. Immediate and delayed free recall were defined as dependent variables; and cortisol, SBP, DBP and anxiety score as independent variables.
Results: In the bivariate correlations, only in the NW adolescent group, SBP was negatively associated with immediate (r = -0.42; P = 0.005) and delayed memory (r = -0.56; P = 0.00007). Regarding multiple regression, although both immediate and delayed regression models were significant (R^2Adj: 0.03; P = 0.047 and R^2Adj: 0.05; P = 0.005, respectively) they were not predicted by cardiovascular stress variables. However, BMI group (NW) significantly predicted delayed memory (b = 0.74; CI95% = [0.09, 1.39]; P = 0.03). Also, we found an increase trend in delayed memory by each 1% increase of cortisol (b =0.1, CI95% = [-0.007, 0.2], P = 0.07), and in immediate memory by each unit of the HADS anxiety score (b =0.1, CI95% = [-0.01, 0.2,], P = 0.087).
Conclusions: Our results suggest a relationship between memory and both psychological and physiological stress. These associations may be influenced by age and BMI. Future studies are necessary to address the possible differences between acute and chronic stress.

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10 Relationship between Working Memory and Cognitive Empathy in IPV perpetrators against women

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Objective: Intimate partner violence (IPV) is a global social and public health issue, with a significant impact among those affected (World Health Organization, 2017). Literature revealed that men who have committed an intimate partner violence crime against women present deficits in the emotional and cognitive factors that contribute to empathy (Covell et al., 2007; Marín-Morales et al., 2021) and that this lack of empathy may be more pronounced when it comes to their partners or ex-partners (Loinaz et al., 2018; Moya-Albiol et al., 2010). Within the cognitive factors, research has demonstrated that IPV perpetrators have a different executive functioning profile, highlighting the possible deficit in working memory (Romero-Martínez et al., 2021). Moreover, previous studies have shown that these cognitive deficits affect empathy, which facilitates the expression of violence and aggression (Gao et al., 2016). Because of the aforementioned reasons, the aim of the present study is to explore whether there is a relationship between working memory and empathy in perpetrators of IPV against women.
Participants and Methods: The study included 1093 male volunteers convicted of a crime of violence against a partner or ex-partner of Andalusia (Spain). The instruments used were the Spanish adaptation of the IRI (Interpersonal Reactivity Index) (Mestre-Escrivá et al., 2004) to measure Perspective Taking and the Letter-Number Sequencing Subtests from the WAIS-III (Wechsler, 1999) to measure working memory. A linear regression was carried out using the number of correct answers of the Letter-Number Sequencing as an independent variable and the Perspective Taking as dependent variable.
Results: Results showed that there was a positive relationship between working memory and Perspective Taking [$F(1,1091)=6,53$; $p<.01$].
Conclusions: IPV perpetrators who had better working memory had a higher cognitive empathy too, which means that they are able to understand the other person's point of view. The findings of this study have important theoretical and practical implications because they provide knowledge about executive functioning in perpetrators of intimate partner violence against women and its relationship with psychological and emotional variables like empathy. Furthermore, these results could be used in order to increase the efficacy of battering intervention programs.

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11 Naming of Topography: Long-Lasting Theta and Long-Lasting Alpha Dissociable Oscillatory Activity

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Objective: The present study aimed at inspecting the particular neural signatures of naming retrieval of topographical information. Furthermore, the known dissociation of proper vs. common nouns in respect to oscillatory activity, which remained unexplored, was evaluated as well.

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Participants and Methods: In the current study 31 participants performed a picture-naming task manipulated by well-known categories (known-object x known-people x known-place). EEG activity was recorded, and the oscillatory activity was extracted. Previous studies evidenced dissociating activity of Theta and Alpha oscillations functionally related to the level of engagements of episodic and semantic memory systems where: Theta power increases in episodic recognition while Alpha power is suppressed in response to semantic processing.
Results: Results showed a clear dissociation of Theta- and Alpha -band power across common and proper names categories. Importantly, places differed from people in the dynamic distribution of oscillatory power in time, with longer and sustained amplitudes in Theta- and Alpha-bands.
Conclusions: This differential activity between people and places is attributed to the increased contextual requirements of topographical information that seems to recruit a more complex and dynamic route to be processed.

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12 The Effect of Intervals After Practicing of a Simple Motor Task and a Complex cognitive Task

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Objective: There is evidence from studies of perceptual, motor and cognitive task learning that skill is acquired in phases even within a single session. Many models of the skill attainment process generally propose two main phases in the process of learning a skill: the first is characterized by fast changes, and the second is characterized by slow changes, indicating stabilization, nearing a plateau, in learning. However, an additional phase can follow, reflected in delayed performance improvements, expressed hours after the termination of practice, i.e., between-sessions. The aim of the present study was to compare the effect of delay intervals following each of the within-session phases, on performance in a motor task, the Finger Tapping Sequence Learning (FTSL), and in a cognitive task, solving the Tower of Hanoi Puzzle (TOHP).

Participants and Methods: Two experiments were conducted for each task. The goal of the first experiment was to determine the amount of practice that is likely to lead to a transition from the fast to the plateau phase within a practice session, in the two tasks. The second experiment consisted of three consecutive sessions with 24-48-hour delays in between. In the first session, participants underwent a short practice (ShortP) without attaining the plateau phase, and in the second and third sessions, they underwent longer practice (LongP), one that would suffice for attaining the plateau phase.
Results: The effects of ShortP in the FTSL, were negligible after a 24-48 hours delay, but after the 24-48 hours delay following LongP, FTSL task performance was further improved (delayed gains). In contrast, while performance continued to improve in the 24-48 hours delay after ShortP in the TOHP, in the 24-48 hours delay following LongP, TOHP performance declined.
Conclusions: We found that two tasks assumed to reflect skill-learning, tapping procedural memory, are differently affected by short and long training as expressed in performance following a delay. These results underscore the complexity of the skill learning process, suggesting that the time-course of skill mastery is contingent on task demands.

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13 Automatized FACEmemory® Scoring Related to Alzheimer's Disease Phenotype and Biomarkers in Early-onset MCI

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Objective: This study aimed to determine whether FACEmemory® scoring is related to performance on classical memory tests and AD biomarkers of brain magnetic resonance imaging (MRI) and CSF in patients with early-onset MCI (EOMCI).
Participants and Methods: Ninety-four patients with EOMCI from the BIOFACE study completed FACEmemory, classical memory tests (the Spanish version of the Word Free and Cued Selective Reminding Test -FCSRT-, the Word List from the Wechsler Memory Scale, third edition, and the Spanish version of the Rey–Osterrieth Complex Figure Test), and a brain MRI. Eighty-two individuals also underwent a lumbar puncture.
Results: FACEmemory scoring was moderately correlated with FCSRT scoring. Concerning neuroimaging MRI results, worse execution on FACEmemory was associated with lower cortical volume in the right prefrontal and inferior parietal areas, along with the left temporal and associative occipital areas. Moreover, the total FACEmemory score correlated with CSF AD biomarkers (Aβ1-42/Aβ1-40 ratio, p181-tau, and Aβ1-42/p181-tau ratio). When performance on FACEmemory was compared among the ATN classification groups, significant differences between the AD group and normal and SNAP groups were found.
Conclusions: FACEmemory is a promising tool for detecting memory deficits sensitive to early-onset AD, but it also allows detection of memory-impaired cases due to other etiologies. Our findings suggest that FACEmemory scoring can detect the AD endophenotype and that it is also associated with AD-related changes in MRI and CSF in patients with EOMCI. The computerized FACEmemory tool might be an opportunity to facilitate early detection of MCI in younger people than 65, who have a growing interest in new technologies.

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14 Classification Of MeMory InTerventions: Development of the COMMIT tool

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Objective: Episodic memory rehabilitation may improve memory functioning in healthy aging, but there is a large variability in the success of such interventions. Furthermore, it remains unclear *which* memory interventions are most effective and for *whom.* This is partially due to the highly heterogeneous components and reporting of memory interventions, causing difficulties in systematically comparing the efficacy of such studies. To facilitate a reporting framework that enables researchers to systemize the content and structural aspects of memory interventions, we developed the Classification Of MeMory InTerventions (COMMIT) tool.
Participants and Methods: We created the COMMIT tool using a 3-stage developmental process. First, a systematic search was performed to identify all memory interventions conducted among healthy ageing individuals published until January 2021 (N=274). Second, among a stratified sample of all memory interventions (N=40), we applied qualitative content analysis with MaxQDA2020 to derive an initial category system. This category system was subsequently validated in another stratified sample (N=5). Lastly, we translated the resulting category system into an interactive PDF. Consensus meetings with experts in the field of cognitive interventions were incorporated throughout the whole process to iteratively validate and refine the COMMIT tool.
Results: Descriptions of the different memory interventions were highly heterogeneous, however we reached saturation of the classification system after coding 34 studies. The implementation of the resulting category system in an interactive PDF resulted in one page, with a total of 23 items, to systematically describe memory interventions in a concise manner. On a second page, we added a section that allows researchers to briefly describe a typical intervention session, together with the outcome measures that were used. In addition, we included detailed guidelines with regards to why the reporting of each item is recommended and how to effectively incorporate this information within the tool.

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Conclusion: COMMIT ultimately provides an easy-applicable tool to classify memory interventions that target healthy cognitive ageing in diverse populations, conversely ensuring the standardization of the reporting of these studies. Notably, however, COMMIT is an evolving tool. To further ensure the quality of COMMIT, we are now validating the tool and corresponding instructions among a panel of independent experts.

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15 "Take Care of your Brain". Catalonian Brain Health Prevention and Detection Program

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Objective: In order to facilitate the detection of early symptoms, reduce the underdiagnosis and help the early diagnostic in dementia, a brain health prevention and detection program named "Take Care of your Brain", from the Federation of associations of relatives of Alzheimer's and other dementias of Catalonia (FAFAC), was carried out in Catalonia.
Participants and Methods: A brief cognitive assessment protocol was administrated to all participants by neuropsychologist, including a global cognitive function (MMSE and MEC Spanish version), memory (Word List of Dementia Assessment Battery and Direct Digits BNB-D), executive function (Frontal Assessment Battey; Fluency test "Animals" "Initial P"; Reverse Digits BNB-D), attention (Trail Making Test A and B); and visual naming test (BNB-D). The cognitive assessment was complemented with Goldberg anxiety and depression test, to determinate the presence of emotional disturbance.A sample of 230 participants took part in this study, between September 2019 and March 2021. All of them initially healthy, with a range of age between 40 and 97 years old (mean: 66,21 SD: 10,59); 73,5% female; 29,6% primary studies and 55,7% Catalan as mother tongue. As exclusion criteria, participants could not have a history of prior psychiatric disorder or neurocognitive disorder (cognitive impairment). All participants were classified considering their cognitive profile, diagnostic criteria of dementia (NINCDS-ADRDA) and mild cognitive impairment (MCI), and emotional assessment, in the Global Deterioration Scale (GDS) of Reisberg. Participants with 2 or more positive punctuations (1 SD below mean) in the cognitive assessment, and/or positive in the emotional assessment were recommended to talk to their medical reference. In addition, participants with a cognitive profile suggested of dementia or mild cognitive impairment, were informed to be treated by their referral doctor (with a written recommendation). A diagnostic was not made in any case.
Results: Using only the global cognitive assessment, different results were obtained, with 72,2% cases without alteration using the MMSE versus 90,4% using the MEC. Also, using only the cognitive impairment criteria for the classification in the GDS scale, 20,4% of the participants could be classified in a GDS-3 (mild cognitive impairment) and 4,8% in a GDS-4. With an alteration in 3 or more test of the assessment protocol in participants in GDS-4 (short- and long-term memory, executive function, and divided attention). Related to the emotional assessment, the 44% of the participants presented anxiety symptoms and 50,9% depression symptomatology. So, including this emotional alteration and the cognitive criteria, the distribution of participants changed, with an 18,7% of our participants with a profile of undiagnosed cognitive impairment (14,8% GDS-3 and 3,9% GDS-4).
Conclusions: The use of one and only global cognitive screening test is not recommended, needing a larger protocol to determinate the presence of cognitive impairment. Also, this study identified participants with cognitive impairment, some of them compatible with a MCI profile, and others with moderate cognitive impairment (dementia) undiagnosed. So, this kind of prevention programs are important to facilitate early detection and assisting in early diagnosis outside hospital units, and facilitate early intervention.

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16 Olfactory Function Reflects Medial Temporal Lobe Integrity in Individuals at Risk for Alzheimer's Disease

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Objective: Olfactory decline often precedes the emergence of cognitive symptoms in Alzheimer's disease (AD), and occurs increasingly frequently in the continuum of the disease development. Despite its potential as a predictive biomarker, it is unclear whether olfactory dysfunction can differentially identify individuals with and at risk for AD from healthy older adults.
Participants and Methods: Using data from the Comprehensive Assessment of Neurodegeneration and Dementia (COMPASS-ND) study, we compared healthy older adults (cognitively unimpaired; CU; N=55), individuals at increasing risk for AD (subjective cognitive decline, SCD, N= 55; and mild cognitive impairment, MCI, N=101), and those with AD (N=45) on measures of olfaction (Brief Smell Identification Test; B-SIT), cognition (Montreal Cognitive Assessment, episodic memory, and semantic memory), and structural integrity of the medial temporal lobe (MTL; hippocampus and entorhinal cortex). All analyses controlled for age, sex, and education; analyses involving MRI data also controlled for estimated intracranial volume.
Results: All groups with or at risk for AD differed significantly in terms of olfactory identification, with a stepwise decrease from AD (*M*=6.00, *SD*=2.78) to MCI (*M*=8.81, *SD*=2.97) and SCD (-*M*=10.33, *SD*=1.69). Healthy older adults out-performed all groups except for SCD on tests of cognition and olfaction (CU, *M*=10.60, *SD*=1.41). Despite the fact that the CU and SCD groups performed equivalently on tests of cognition and olfaction, olfactory dysfunction significantly correlated with tests of episodic memory and with MTL structures (the hippocampus and entorhinal cortex thickness) only in the SCD and MCI groups. This suggests that olfactory function reflects MTL integrity only in groups at risk for AD.
Conclusions: Our results may set the groundwork for longitudinal research that would investigate whether a diagnosis of dementia may be predicted from at-risk groups using a test of olfactory function.

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17 Validation of the Comprehensive Assessment of Neurodegeneration (COMPASS-ND) Study Neuropsychological Battery

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Objective: The Canadian Consortium for Neurodegeneration in Aging (CCNA) is a research initiative to understand the mechanisms of neurodegenerative illness, its prevention, treatment, and improving the quality of life of those with dementia. Neuropsychological assessment is a crucial component of the diagnosis of dementia and the specification of its various etiological subtypes. A central platform of the CCNA is the Comprehensive Assessment of Neurodegeneration (COMPASS-ND) study, which is an observational study of over 1000 participants with or at risk for developing a neurodegenerative disease. These participants include older adults with normal cognition (NC), subjective cognitive decline (SCD), mild cognitive impairment (MCI), Alzheimer's disease (AD), vascular dementia, mixed dementia, fronto-temporal lobar dementia, Parkinson's disease/Lewy body dementia). Performance on these neuropsychological tests, together with MRI imaging, biosample, genetics, and clinical data will be used to characterize the groups and to provide research data.
The current report aims to provide an overview of the cognitive test battery and initial findings from the second data release. We will describe the rationale for and the goals of the battery, the process of its development (including parallel versions in both English and French), its current content, and its alignment with other neurodegeneration research initiatives in Canada and the United States.
Participants and Methods: Participants consist of 60 participants with NC (49 women; mean Age=69.2, Education=15.8), 56 with SCD (43 women; mean Age=70.0, Education=17.0), 104 with MCI (46 women; mean Age=71.5, Education=15.6), and 48 with AD (16 women; mean Age=74.6, Education=15.3). They did not differ in level of education, but the AD participants were significantly older. All analyses used age, education, and sex as covariates.

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Results: As expected, all groups differed significantly from each other, except for the Controls and the SCD groups, in terms of episodic memory performance (delayed recall on word list learning, visual memory, and face-name association), simple and choice reaction time, measures of executive function (phonemic and semantic fluency, Stroop interference scores). In general, AD participants differed from all groups in terms of performance on tests of language and semantic abilities; in addition, MCI participants performed more poorly than Controls and SCDs on tests of verb naming, reading irregular words, and grammatical sentence construction. In general, SCD participants did not differ from Control participants, except for poorer performance on the Judgement of Line Orientation.
Conclusions: Overall, the COMPASS-ND neuropsychological battery is shown to be valid and sensitive to expected differences between participant groups. It demonstrates that participants with MCI in COMPASS-ND can be characterised as having amnestic MCI with deficits in other cognitive domains including language, executive function, processing speed, and visuo-spatial functioning. Participants with SCD show normal cognitive performance at the univariate level, although future analyses will determine whether they show subtle cognitive alterations on a multivariate level (e.g., network analysis). The current results establish the baseline cognitive results that will contribute to the research programs of the CCNA.

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18 Background Music and Memory in Mild Cognitive Impairment: The Role of Arousal

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Objective: Research in the field of memory has found mixed results for the role of background music on consolidation and retrieval. One key question is which level of arousal induced by music is needed to boost memory consolidation. In healthy individuals, Nguyen and Grahn (2017) found that the performance in a memory task was higher when participants were exposed to low-arousal music in comparison to high-arousal music. Nevertheless, the evidence that arousal may play a central role in memory consolidation in individuals with memory deficits, such as patients with Mild Cognitive Impairment (MCI), is little (Gorenc-Mahmutaj et al., 2019). In the present study, we aim to investigate the role of arousal (low vs. high) on memory in patients with amnestic MCI.
Participants and Methods: Twenty-five outpatients with amnestic MCI (16 females; mean age: 76.2, SD= 4.8), from the Hospital de la Santa Creu i Sant Pau in Barcelona, took part in the study. Participants underwent a neuropsychological assessment and performed two face memory tasks.
During the encoding phase, unfamiliar faces were displayed and participants made a gender judgment task and asked to encode the faces. During the recognition phase, participants were asked to judge whether the faces were 'old' (presented during the encoding phase) or 'new'. Participants performed the task twice and music was played during both encoding and recognition. In one condition they were exposed to high-arousal music (instrumental version of 'Un rayo de sol' by Los Ladros) and in the other to low-arousal music ('Adagio' by Johann Sebastian Bach). The selection of these two excerpts was done according to the rating given by an independent sample of individuals. Additionally, music preferences were collected with the Barcelona Music Reward Questionnaire (BMRQ) (Mas-Herrero, Marco-Pallares, Lorenzo-Seva, Zatorre, & Rodriguez-Fornells, 2013) and individual judgments for happiness, arousal, and pleasantness were collected for each excerpt.
Results: First, the role of arousal was found to be significant only when the order of music condition (high/low-arousal or low/high-arousal) was included in the analysis. Individuals who were exposed to low-arousal music first showed better memory performance in both conditions (low-arousal d' values: M=1.12, SD= .36; high-arousal d' values: M= .77, SD= .36) than those who were exposed to high-arousal first (high-arousal d' values: M= .46, SD= .56; low-arousal d' values: M= .52, SD= .43). Second, the more the music was rated as happy the higher was the music-induced benefit on memory (high arousal: r= .37, p<. 05; low arousal: = .47, p<. 05). Third, the factor 'mood regulation' of the BMRQ positively correlated with the memory performance (high arousal: r= .38, p<. 05; low arousal: r= .48, p<. 05).
Conclusions: Background music modulates memory performance in individuals with MCI

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when it induces low levels of arousal and is presented at both encoding and recognition. Individual factors, such as perceiving background music as happy and mood regulation, are key factors for increasing the benefits of music on memory consolidation.

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19 An integrated virtual reality program of prospective memory in a case of prodromal Alzheimer's Disease

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Objective: Extensive literature has pointed out that virtual reality (VR) represents an innovative therapeutic base for the implementation of cognitive remediation programs in the field of cognitive and pathological aging, in particular in the early stages of Alzheimer's disease. (Garcia-Betances et al. 2015, La Corte et al. 2018). Our goal is to provide a cognitive remediation program for different activities of daily living targeting prospective memory (PM) in prodromal Alzheimer's disease. PM helps to remember to perform an action at a specific time in the future and is involved in a wide range of activities of daily life. It is usual to distinguish two components: a prospective component, which corresponds to a marker making it possible to remember an intention at the appropriate time and place, and a retrospective component, which corresponds to the content of this intention.
Participants and Methods: In this context, we carried out a first feasibility study in a patient with AD in the prodromal stage of the disease (Mrs IM). Before the treatment, the neuropsychological evaluation of Mrs IM showed the presence of an isolated hippocampal-type amnesic syndrome affecting retrieval and storage process, in the absence of executive and instrumental disorders. The VR assessment of PM shows the presence of a severe deficit of the retrospective as well as the prospective component. The training VR program consists of 8 two-hour sessions over 10 weeks. Our main objective is to promote the retrospective component by using classic techniques of cognitive remediation largely used in the field of long-term memory remediation (i.e mental imagery, vanishing cueing, spaced recovery), with the aim of also improving the prospective component of PM.
Results: The comparison of pre - and post-treatment evaluations shows: a clear improvement in storage capacities in the Free and Cued Selective Reminding Test (FCSRT, reactivity to indexing improved from 25% to 41%), as well as in the retrospective component of prospective memory (measured by the virtual reality task), an increase in awareness of the memory disorders on the retrospective as well as on the prospective side. (Measured with the prospective and retrospective memory questionnaire, Smith et al. 2000).
Conclusions: Altogether, these results highlight the feasibility of prospective memory-based program in virtual reality and represent the plinth on which we will design an innovative remediation cognitive program for an oncoming randomized group study.

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20 Efficacy of an Online Focused Holistic Neuropsychological Intervention for Older Adults with Cognitive Decline

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Objective: Older adults with cognitive decline are at risk for functional deteriorating, and it is essential to develop and assess interventions that may delay their progress to dementia. When the Covid-19 pandemic broke, older adults with cognitive deficits where at increased risk for declining faster, due to the disease characteristics, social isolation, decreased activity, increased depression and anxiety, and limited access to health services. To provide this population with treatment despite current constraints, we designed a short-term online intervention program, based on holistic neuropsychological rehabilitation principles, and adapted to the particular needs of this population at these times. The study's objective

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was to assess the program's feasibility and effectivity.
Participants and Methods: Participants were 24 older adults (14 females, mean age = 70.1 years), with mild cognitive impairment or subjective cognitive decline (mean MoCA score = 23.8, mean AD8 score = 2.3). The entire program and assessments were conducted online. Measures included the NeuroTrax Mindstreams battery, and questionnaires assessing everyday functioning, wellbeing, life satisfaction, depression and anxiety, self-efficacy, hope, and family members' burden. Measures were administered before and after the three-month long program, and three-months after its completion. The intervention included two weekly meetings conducted by neuropsychologists, individually or in groups of 6, following a fixed protocol. One weekly meeting focused on psychoeducation about brain and cognitive changes, promoting metacognition and strategies that may compensate for cognitive deficits and improve functional adjustment, improving mood and wellbeing by practicing mindfulness meditation, and increasing acceptance. Following holistic neuropsychology principles, the program also promoted a balanced lifestyle that includes physical, social, and cognitive activities, and healthy habits that may reduce common risk factors. Homework assignments included computerized training, mindfulness training, and keeping track of adaptation to new strategies. Another weekly meeting was devoted to technological support, and homework assistance. Family members participated in three meetings that included psychoeducation about similar content participants were taught, with a particular emphasis on encouraging the intervention's outcomes at home, preparing for the future, and maintaining their own wellbeing.
Results: Adherence to the program was high, with no dropouts, and participants reported moderate to high satisfaction with the program. Global cognitive scores significantly increased by the end of the program and this gain was maintained at follow-up. Memory was stable by program completion but significantly increased at follow-up testing. Attention and executive functioning significantly increased by program completion but declined back to baseline levels at follow-up. Visual-spatial functioning significantly increased at program completion as well as through follow-up, and verbal function and information processing speed did not significantly change. Participants' self-efficacy, wellbeing, and life satisfaction increased, though not all changes were statistically significant, and family members' burden decreased.
Conclusions: A focused online holistic-based program targeting cognitive decline in older adults was feasible. Preliminary pilot results suggest it is effective in terms of cognition and psychological measures. Future studies should include a control group, and measure generalization of the intervention's outcomes. Longer-term follow up studies could determine whether the intervention may delay dementia onset.

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21 Verbal Fluency in Bilinguals and Monolinguals with MCI: A Six-Month Follow-Up Study

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Objective: Although controversial, bilingualism has been associated with executive function benefits and delayed onset of Alzheimer's disease (Bialystok et al., 2014) but this has been less studied in mild cognitive impairment (MCI). We evaluated whether bilingualism is associated with a lower decay in executive function in MCI by comparing verbal fluency (VF) performance in bilinguals (B-MCI) versus monolinguals (M-MCI) over 6 months.
Participants and Methods: Thirteen Spanish-Catalan B-MCI (5 female, age 74±7.7) and nine Spanish M-MCI (6 female, age 70.8±5) completed neuropsychological assessments of semantic VF (animals, kitchen utensils, fruits and vegetables), letter VF (P-M-R), excluded letter VF (A-E-S), nonverbal executive function (CLQT), bilingualism (LHQ-3), language switching (LSQ) and cognitive reserve (CRIq) questionnaires, in an initial session (T1) and 6 months apart (T2).
M-MCI and B-MCI were comparable in years of education, age, time from subjective complaint onset, and MMSE scores (all p values ≥.149). B-MCI had comparable competence, dominance and switching across their two languages (all p values ≥.07), enabling comparisons with M-MCI in VF in Spanish. For each VF condition: semantic (S-VF), letter (L-VF) and excluded letter (EL-VF), the number of correct responses (CR) were averaged across the 3 corresponding VF tasks. Also, two fluency difference scores (FDS) [FDS=(semantic fluency CR – letter-based fluency CR)/semantic

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fluency CR] were computed to contrast L-VF versus S-VF (FDS1) and EL-VF versus S-VF (FDS2). Lower FDS scores indicate better executive control in letter-based VF tasks (Friesen et al., 2015).
Results: A repeated measures ANOVA on CR with group (M-MCI, B-MCI) as between-subject factor and condition (S-VF, L-VF, EL-VF) and time (T1, T2) as within-subject factors revealed significant main effects of time $F(1,20)=6.492, p=.019$ (T2>T1, $p=.019$) and condition $F(2,40)=44.411, p<.001$ (S-VF> L-VF> EL-VF, all p values ≤.003). However, the time x group x condition interaction $F(2,40)=1.641, p=.208$, the main effect of group $F(1,20)=0.375, p=.547$ and both group-based interactions [time x group $F(1,20)=1.672, p=.211$; condition x group $F(2,40)=1.632, p=.216$] were statistically non significant. Thus, both groups' performance remained comparable over time and across conditions despite small increments of VF performance over time and performance differences across conditions.
A similar analysis on FDS revealed a main effect of condition (FDS2>FDS1, $p<.001$) indicative of EL-VF being more taxing on executive functions than L-VF. Although lower FDS1 and FDS2 scores (better executive function on letter-based VF tasks) were observed for B-MCI relative to M-MCI at both T1 and T2, all group and time main effects and their interactions were non significant. Finally, significant negative correlations were found between cognitive reserve (CRIq scores) and nonverbal executive function (CLQT scores) at T1 and FDS1 and FDS2 scores at T1 and T2 only for B-MCI (all p values ≤.047).
Conclusions: Preliminary findings suggest that although VF performance is associated with cognitive reserve and nonverbal executive function in B-MCI, bilingualism is not associated with a slower decay in executive function as measured by VF tasks, at least detectable at 6-month follow-up testing. These findings require corroboration from longitudinal studies with larger samples undergoing longer periods of follow-up assessments.

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22 Emotion Perception in Mild Cognitive Impairment and High Functioning Autism

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Objective: To compare the performance on a face emotion recognition task in two groups of patients from different departments of a reference hospital.
Participants and Methods: A comparative case study was carried out in a total of 71 participants. From those, 47 with amnestic mild cognitive impairment (aMCI; mean age = 53.7 ± 15.7) and 24 high functioning autism (HFA; mean age = 20.4 ± 8.8) underwent a comprehensive evaluation including the Emotion Recognition Assessment Test (ERAT).
Results: After controlling for age, effect size for the *ERAT total score* was better for the aMCI group ($p < 0.001$). Post hoc analysis of basic emotion showed: a) HFA group performed better on *sadness* ($p < 0.001$), *happiness* ($p < 0.001$), and *fear* ($p < 0.01$); b) the aMCI group performed better on *disgust* ($p < 0.01$); c) there were no group differences on *anger*, *surprise* and *neutral* facial recognition.
Conclusions: There is a different pattern on facial emotional recognition of both groups, probably related to its intrinsic characteristics. These findings should be taken into account for improving emotional perception interventions in these clinical conditions.

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23 Profile and neural correlates of language disintegration in early Huntington's disease

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Objectives: The profile of cognitive impairment of HD has been considered to eminently have fronto-subcortical dysexecutive characteristics and almost absent aphasic features.
The most widely recognized language impairment in HD is dysarthria, but other signs, such as reduced fluency and syntax abnormalities, are well known entities attributed to basal ganglia involvement.
Clinical examination of individuals with HD illustrates a complex and highly heterogeneous cognitive phenotype, including linguistic disturbances. However, the characteristics of language disturbances of HD and the associated brain correlates have been largely omitted in the context of the study of the cognitive profile of HD.
The main objective of the present study was to explore the language profile of early Huntington's disease (HD) and the neural correlates that accompany the development of linguistic alterations in HD.
Participants and Methods: We used the Mini Linguistic State Examination (MLSE) to characterize the profile of language impairment, according to the characteristics of the different forms of progressive aphasia, in a cohort of 30 patients with early-stage HD.
T1 MRI sequences from all patients were used to explore the gray matter volume (GMV) and cortical thickness (Cth) correlates (FWE $p < 0.05$ corrected) of the different linguistic disturbances found.
Results: The MLSE total score was found to be in the impaired range [82.4 (13.9); range = 52 - 98] at the expense of lower performance in phonology, syntax, working memory and in the praxical component of speech. Semantic impairment was less relevant.
The topography of the brain regions involved in this language profile showed similarities with the topography defining some primary progressive aphasias. The neuroimaging analysis showed significant associations between language performance and several nodes of the temporo-parietal and fronto-striatal lexical-semantic and syntactic networks and nodes of the sensorimotor network.
Conclusions: From the early stages, HD may associate signs of language disintegration related to extensive fronto-temporo-parietal and striatal territories. Possibly, language impairment in HD occurs in a heterogeneous manner between patients, associating in some cases a phenotype similar to non-fluent agrammatic progressive aphasias. The mechanisms that explain the development of these deficits, the heterogeneity between patients and the role of these symptoms in the cognitive course of HD deserve to be studied in depth.

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24 Deep Brain Stimulation in Dystonia: the Added Value of Neuropsychological Assessments

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Objective: Dystonia is a hyperkinetic movement disorder characterized by sustained or intermittent muscle contractions causing abnormal, often repetitive, movements, postures, or both. In addition to motor symptoms, non-motor features including cognitive problems are recognized as part of the disorder. Among these problems, deficits in higher-order cognitive functions such as executive functioning and social cognition may be present in dystonia patients. Deep Brain Stimulation (DBS) of the internal Globus Pallidus (GPi) is a recognized treatment for medication-refractory dystonia. The impact of pallidal DBS on cognition appears limited, but not all cognitive domains have been investigated yet. In the present study, we compare cognition before and after GPi DBS.
Participants and Methods: Twenty patients with dystonia of various etiology completed pre- and post-DBS assessment (mean age 52 years; range 20-70 years). Neuropsychological assessment covered intelligence, verbal memory, attention and processing speed, executive functioning, social cognition,

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language and a depression questionnaire. Pre-DBS scores were compared with a healthy control group matched for age, gender, and education, or with normative data.
Results: Patients were of average intelligence, but had affected planning skills and were slow on reading and naming. Otherwise, they were cognitively intact, including social cognition. DBS did not change the baseline neuropsychological scores (time period between assessments 1-5 years). Correlations between neuropsychological scores and symptoms of anxiety and depression were not significant. Dystonia severity scores correlated significantly with the verbal memory encoding, working memory and processing speed.
Conclusions: In this study, we found that pre-DBS, social cognition in dystonia patients was normal. However, executive functioning and speed of information processing were impaired. Overall, GPi-DBS did not impact cognitive functioning. Dystonia severity was significantly correlated with verbal memory encoding, working memory and a test of processing speed. In line with earlier studies on cognition in adult dystonia patients, our neuropsychological assessment pre-DBS showed slow cognitive speed and planning impairments. These results underline that dystonia also has an impact on non-motor symptoms. Seven patients in our cohort had more cognitive complaints after DBS (difficulties in finding words, concentration, memory, or speed of processing), but the post-DBS tests did not detect significant changes in cognitive functioning. Instead, in those cases, the pre- and post-DBS data supported an adequate diagnosis. Pre-DBS neuropsychological assessments appear useful as they support clinicians in counseling their patients. Post-DBS neuropsychological assessments can be helpful but are not necessary as a standard procedure.

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25 Is the anterior attentional system impaired in patients with Parkinson's disease? A pilot study

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Objective: Participants with Parkinson's disease, apart from movement decline, often present cognitive difficulties (mainly executive functions problems) related to disruption in frontal-striatal networks. Moreover, the reaction slowness – the cardinal Parkinson's disease symptom – may be the result of anterior attentional system impairment, in which basic process is associated with energy distribution (energization). Hence, the main purpose of this study was to investigate processes of the anterior attentional system (energization, monitoring, and task-setting) in two groups of individuals with Parkinson's disease: (1) with normal cognition (PD-NC), (2) with mild cognitive impairment (PD-MCI), who were compared with matched individuals without Parkinson's disease. s
Participants and Methods: In this pilot study, an abbreviated version of the definitive project with a limited number of participants and measurements was implemented. From February 2020 to September 2020, 45 individuals with Parkinson's disease and 51 without Parkinson's disease were enrolled, of whom 39 (mean age 65.31; 43.59% men) were included in the study and allocated to three groups (13 participants per each). There were no significant differences between groups in terms of demographic data. To assess the attention, three tasks from the ROtman-Baycrest Battery for Investigating Attention were used: Simple Reaction time (RT), Choice RT, and Prepare RT. Additionally, participants with Parkinson's disease undertaken the neurological examination, while all individuals underwent the neuropsychological examination. In neurological examination the MDS-Unified Parkinson's Disease Rating Scale was used to assess the severity of the disease. The data data about daily Levodopa dose was also collected. Participants with Parkinson's disease were divided into two groups (PD-NC and PD-MCI) based on their results obtained in neuropsychological examination. A mixed model analysis of variance with a 3 (groups) x 4 (tasks) design was conducted to compare reaction times across studied groups and tasks.
Results: Reaction times in the PD-MCI group were slower than in the PD-NC group (p = .028) and marginally slower than in the comparison group (p = .052), while there was no difference between the PD-NC and comparison group. The number of errors showed that PD-MCI might perform worse on monitoring tasks than the PD-NC groups (Z = -1.68, p = .092).
Conclusions: Notwithstanding limitations, the current findings add to a growing body of literature on the attentional and executive processes in individuals in Parkinson's disease. Due to limitation the obtained data should be interpreted cautiously. This research has thrown up many questions that need further investigation.

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26 Home-to-Home Tele-neuropsychology in Deep Brain Stimulation Assessments of Dystonia Patients During COVID-19

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Objective: Dystonia is the third most common movement disorder and deep brain stimulation (DBS) surgery offers improvement in motor symptoms and quality of life for treatment refractory patients with various forms of dystonia. The COVID-19 pandemic led to an adaptation of standard neuropsychological assessment of DBS candidates due to physical distancing and safety requirements. This pilot study evaluates the feasibility, implementation and clinical utility of home-to-home tele-neuropsychology (TeleNP) in determining DBS candidacy in patients diagnosed with dystonia.
Participants and Methods: Dystonia patients considered for DBS [n=6, M_{age}=59.1(18.1), M_{edu}=15.2(3.31), 66.7% male, 33.3% Hispanic, 66.7% tested in English] underwent neuropsychological (global cognition, language, memory, visuospatial ability, attention, processing speed) and mood assessments via home-to-home TeleNP between November 2020 and February 2022. Descriptive statistics were computed to characterize the dystonia presurgical group.
Results: All six patients completed the neuropsychological evaluation across two 2-3 hour virtual testing sessions using the Zoom platform. Five candidates were approved and scheduled for DBS, one was not approved and referred to other therapy and mood symptom management. The dystonia patients demonstrated below expectancy scores on overall cognition [MoCA M_{raw}= 24.2(*SD*=5.04)], language [Boston Naming Test $M_{T\text{-}score}$=43.8(*SD*=14.6); COWAT FAS/PTM $M_{T\text{-}score}$=45.0(*SD* =10.3); Animals $M_{T\text{-}score}$=37.2(*SD* = 15.5)] and memory [CVLT-3/MAMI M_{ss}=7.20(*SD*=3.11)]. Performance was intact on visuoperceptual functioning [WAIS-IV Matrix Reasoning M_{ss}=8.83(*SD*=3.43)] and executive functioning [Oral Trails-B $M_{T\text{-}score}$=46.5(*SD*=13.6)]. Patients endorsed minimal depression and anxiety symptoms [BDI-2 M_{raw}=5.33(*SD*=6.95); BAI M_{raw}=4.83(*SD*=3.60)].
Conclusions: All candidates successfully completed a comprehensive virtual evaluation. Results were discussed during case conference meetings and the treatment team made decisions regarding the appropriateness of surgical intervention. TeleNP appears to be a feasible platform for safely assessing dystonia patients for DBS surgical candidacy, which plays a critical role in maintaining continuity of care for this disabling condition. Home-to-home TeleNP will transform healthcare practices as it offers prompt DBS assessment, minimal exposure concerns, mobility-related equity, and increased family and/or caregiver involvement for optimal patient care.

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27 Mood and Dysexecutive Changes are Associated with Caregiver Burden in de novo Parkinson's Disease

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Objective: In advanced Parkinson's Disease (PD) patients' neuropsychiatric symptoms and dysexecutive problems are consistently associated with caregiver burden. However, few studies have investigated whether this is also already the case in treatment naïve, *de novo* PD patients and their caregivers. The aim of the study was to assess the degree of caregiver burden in proxies of treatment-naïve, *de novo* PD patients, and to examine whether patients' neuropsychiatric characteristics (mood, anxiety and apathy), and subjective executive daily functioning are associated with caregiver burden in this early disease stage.
Participants and Methods: 107 pairs of treatment-naïve, *de novo* PD patients and their proxies (67% and 29% male, respectively), and 66 healthy controls and proxies (58% and 36% male, respectively) from the Dutch Parkinson and Cognition Study were included. Caregiver burden was assessed with the Zarit Burden Interview (ZBI). Mood and anxiety were assessed using the Hospital Anxiety and Depression Scale (HADS-A for anxiety and HADS-D for depression/mood), and apathy was measured with the Apathy Evaluation Scale

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(AES). Subjective executive daily functioning was assessed using the Dysexecutive Questionnaire (DEX-self and DEX-proxy). First, patients and healthy controls were compared on ZBI, HADS, AES and DEX scores, using Mann-Whitney U tests. Second, Spearman's rho was used to assess correlations between ZBI score and HADS, AES, and DEX scores in the PD group. Finally, a stepwise hierarchical multiple regression analyses was performed in order to identify predictors of ZBI in the PD group, with HADS, AES, and DEX scores as possible predictors. Measures of motor symptom severity (Movement Disorders Society – Unified Parkinson's Disease Rating Scale part III) and global cognitive functioning (Montreal Cognitive Assessment), were entered to the model as control variables.
Results: Proxies of PD patients reported significantly higher caregiver burden than proxies of healthy controls ($p<.001$), with 11% of patients' proxies experiencing elevated burden. In addition, HADS-A, HADS-D, AES, and DEX-proxy scores were significantly higher in the PD group compared to healthy controls ($p=.008$, $p<.001$, $p<.001$ and $p=.034$, respectively), indicating that levels of neuropsychiatric characteristics and proxy-reported dysexecutive problems are already elevated in *de novo* PD patients. Correlational analyses yielded strong associations between ZBI and DEX-proxy ratings ($\rho=0.61$). Moderate associations were found between ZBI and both AES ($\rho=-.45$) and DEX-self ($\rho=.41$). HADS-D and HADS-A were weakly correlated to ZBI ($\rho=.31$ and $\rho=.28$, respectively). These correlations indicate that higher levels of neuropsychiatric characteristics and subjective dysexecutive problems are associated with higher caregiver burden. A multiple regression analysis yielded a significant model ($F(4, 101) = 25.30$, $p<.001$, $R^2=.48$), with ZBI scores being predicted by HADS-D ($\beta=.55$, $p=.006$) and DEX-proxy ($\beta=.47$, $p<.001$). Motor symptom severity and global cognitive functioning were not significant predictors of ZBI scores.
Conclusions: The main findings are that even in proxies of treatment naïve, *de novo* PD patients, caregiver burden is elevated and is related to the patients' mood and proxy-reported changes in executive daily functioning. Targeting depression in patients and proxies' perceptions of dysexecutive problems, might be particularly effective in reducing caregiver burden.

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28 Validation of the BICAMS in Catalan population

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Objectives: The Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS) is a short battery that has been validated in several languages, including Spanish, but in Catalunya there is a need of having a Catalan version to assess the individuals in their mother tongue. The aim of the present study is to validate the Catalan version of the BICAMS battery in a sample of patients with Multiple Sclerosis (MS), and a sample of healthy subjects, as well as to study the influence of clinical and sociodemographic variables on cognitive performance.
Participants and Methods: We recruited 112 subjects, including 47 people with MS and 65 healthy control (HC) matched by sex, age, and education. The Catalan version of the BICAMS was administered, which includes the SDMT, the CVLT-II and the BVMT-R. Forty-four participants (34 MS and 10 HC) were re-tested in an interval of 1 to 3 weeks. BICAMS mean scores were compared between groups through t-student test and correlations and linear regressions were used to explore the effect of sociodemographic and clinical variables.
Results: The MS group scored significantly lower than the HC one in all three BICAMS tests ($p<0.05$). Test-retest reliability was satisfactory ($r=0.82$-0.71) for all three neuropsychological tests. Based on the criterion of scores below the value of the 5th percentile of the HC in one or more tests, 30% of the MS presented cognitive impairment. The variables that significantly influenced the performance of the tests were age, education, and the degree of disability (measured through the Expanded Disability Status Scale; $p<0.05$). The years of disease evolution, however, did not significantly correlate with performance, but some trend was observed ($r=0.06$; $p<0.05$).
Conclusions: The Catalan version of the BICAMS delivers good psychometric properties and is valid as an instrument for assessing cognitive impairment in Catalan population diagnosed with MS. Early detection of cognitive impairment is vital in order to improve the quality of life of these population; as it is a disease that mainly affects young adults, it can have a major impact in the labour, social and personal fields. The data provided in this study may be useful in the cognitive assessment of these patients in our environment.

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29 The Effectiveness of an Intensive 3-Back Training in Multiple Sclerosis Patients and the Transfer Effects

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Objective: Multiple Sclerosis (MS) causes cognitive disabilities and contributes to decrease the patient's quality of life. Specifically, working memory (WM) and information processing speed (IPS) are two of the most common cognitive alterations present in this disease. Thus, neurorehabilitation is essential to reduce this cognitive impairment in MS patients. The main objectives of this study were: 1) To test whether repeated 3back practice leads to a performance improvement in this task: increased number of correct responses (CR) and reduced reaction time (RT); and 2) to test if this improvement is transferred to other WM and IPS related tests.
Participants and Methods: We recruited a group of MS patients (n=35) with different phenotypes of the disease: relapsing-remitting (n=25), secondary progressive (n=5) and primary progressive (n=5). All patients were neurological and neuropsychological assessed using the Brief Repeatable Battery of Neuropsychological Tests (BRB-N), and the letters and numbers sequencing test (LNST), and the forward and backwards digit-span test (DSBT) of the Wechsler Adult Intelligence Scale (WAIS-III) at two different time points, before any training and (D1) after the 10-days training (D10). WM training consisted of a 3-back task during 10 training days/60 min per day. To test the effectiveness of the 3-back training and the transfer of this improvement to other WM tests the cumulative distribution functions (CDFs) of the 3back scores in D1 and D10 were calculated and the quartile values of these distributions were compared. An individual net score improvement (NSI) was calculated as the D10-D1 3-back score difference.
Results: Repeated 3-back practice resulted in a CR improvement. Specifically, all the quartile values were significantly larger in D10 as compared to D1 ($p<0.001$). Moreover, 91.4% of patients showed 3-back scores at D10 equal or higher than the D1 mean (U3= 91.4% [80,10], $p>0.001$]. At the individual level, 91.42% of patients increased the number of CR and the NSI was statistically significant from 0 (median=7 [3,9], accuracy gain=29% [12.5, 37.5], $p<0.001$). 3-back practice also improved RT. Thus, all the quartiles values in D10 were smaller than in D1 ($p<0.01$). 82.9% of patients showed lower RT at D10 vs D1 (U3=82.9% [68.6, 91.4] $p<0.001$). At the individual level, 77.14% of patients reduced their RT and the median RT reduction was significantly different from 0 (113.3 [51.1, 186.8], $p<0.001$). Finally, we also observed a transference of this improvement in 3 back to other WM/IPS tests. Specifically, statistically significant pre-post training differences were found in the values of the three quartiles of the Paced Auditory Serial Addition Test (PASAT; q25, $p<0.004$; q50 $p<0.001$, q75 $p<0.002$); two quartiles of the LNST (q50, $p<0.006$; q75 $p<0.001$) and two of the DSBT (q25 and q50, $p<0.001$) and the SDMT (q25 $p<0.02$ and q50 $p<0.001$).
Conclusions: The results showed that intensive 3 back training increases CR and reduces RT. Furthermore, this improvement is not only restricted to 3-back performance, but it also leads to an improvement in other WM and IPS tasks.

30 Relationship Between Depression, Fatigue and Cognitive Impairment in Multiple Sclerosis Patients

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Objective: Depressive disorders occur in up to 50% of Multiple Sclerosis (MS) patients. One of the most used questionnaires to assess depression in neurological patients is the Chicago Multiscale Depression Inventory (CMDI), which has been recently translated and adapted to the Spanish by our laboratory. This questionnaire contains three subscales (mood, evaluative, and vegetative) that can be interpreted separately and that examine the different features of depression. The main objective of this study was to assess depressive symptomatology in a cohort of MS patients by comparing their scores in the three subscales of the CMDI and their relationship with clinical and cognitive variables related to MS. This assessment was conducted with the patients as a whole and also by comparing patients "probably-depressed" (P-Dep) and "non-depressed" (N-Dep) according to their CMDI scores.
Participants and Methods: 187 MS patients were recruited for the study with different MS phenotypes: MS relapsing-remitting (RR

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n=113); secondary-progressive (SP n=31) primary-progressive (n=13) and clinically isolated syndrome (CIS n=32). All patients were assessed with the CMDI, the Brief Repeatable Battery of Neuropsychological Test (BRB-N) and the Fatigue Severity Scale (FSS). Spearman correlations were employed to explore the relationship between these variables. Comparisons between P-Dep and N-Dep patients in demographic, clinical and cognitive variables were conducted by Student's t test. Finally, a finer grain comparison between P-Dep and N-Dep was conducted by analyzing the cumulative distribution functions (CDFs) in clinical and cognitive variables.
Results: The correlation analysis revealed that FSS and the Paced Auditory Serial Addition Test (PASAT) were the clinical/ cognitive variables more clearly associated to the CMDI scores. The strength of these associations varied for the different CMDI subscales (i.e., FSS and PASAT were maximally correlated to the scores in the vegetative and evaluative subscales (rho=0.54 and rho=0.45, respectively). About 26.5 % of patients presented depression scores high enough to be considered as P-Dep. As compared to N-Dep, the P-Dep group presented higher average FSS scores and a larger cognitive impairment that was more prominent in those tests known to be more sensible to cognitive impairment in MS patients (e.g., PASAT). The size of these average differences varied depending on the CMDI subscale. Thus, the FSS differences were larger when the P-Dep and N-Dep groups were defined according to patients' scores in the vegetative subscale ($t=6.8$, $p<0.001$,$d=1.03$) whereas the PASAT differences when these groups were defined from the evaluative subscale's scores ($t=5.28$, $p<0.001$, $d=0.94$). CDF comparisons confirmed and extended these findings by showing that P-Dep and N-Dep differences were not restricted to their means, but present in each quartile.
Conclusions: We found that different dimensions of depressive symptomatology (which are separately evaluated by the three CMDI subscales) are differentially associated with specific handicaps and sequelae characteristic of MS. These findings are relevant for improving the diagnosis of depression in MS patients because and to further understand the relationship of depressive symptomatology with physical and cognitive deficits in MS.

31 Avaluation of Socioemocional intervention in Multiple Sclerosis

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Objective: Multiple sclerosis (MS) is a neurological and progressive disease, which by an autoimmune process attacks the myelin of the central nervous system causing disabling physical impairments. These have an emotional and social repercussion that can lead to serious mood disorders.
Participants and Methods: From the present study, a socio-emotional intervention program is developed in order to reduce depressive and anxious symptoms in patients diagnosed with MS and thus improve their quality of life. Nine 90-minute online sessions are conducted on 7 patients diagnosed with MS where different CBT-based techniques are applied. The evaluation of the program is carried out through a comparative pre-post intervention based on three questionnaires (STAI, BDI-II and SF-36) and an ad hoc survey.
Results: The results show a significant correlation between the variables pre-post intervention in the BDI-II and STAI questionnaires and the survey concludes a satisfactory assessment of the intervention by 3 patients. The SF-36 questionnaire correlates dimensions focused on mental and emotional health and pain perception.
Conclusions: These results are further evidence of the importance of good mental and emotional health in patients with chronic illness in order to reduce and improve their perception of pain in the face of the disease and opens a way for new lines of research on the subject.

32 Glatiramer Acetate, Oxidation and Cognition in in Multiple Sclerosis patients

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Objective: Multiple Sclerosis (MS) is a chronic, inflammatory, demyelinating disease, which affects the central nervous system (CNS), causing axonal degeneration and astrogliosis. It is characterized by a variety of signs and symptoms, one of which is cognitive impairment (CI). The EDSS is the scale that measures disability in patients with MS, although it tends to underestimate the degree of cognitive impairment. When studying the pathological mechanisms that cause CI in other neurodegenerative diseases, it has been shown that oxidative stress (OS) may influence the appearance or degree of CI. However, we do not know whether this phenomenon is greater in patients with MS (pwMS) and CI than in those who do not present signs of CI, or whether disease modifying treatments can modulate OS. It has been observed, in vitro, that Glatiramer Acetate (GA) can reduce the production of free radicals. Ex vivo, a similar inhibition has been demonstrated in mononuclear cells obtained from GA-treated patients. Based on the above, we proposed two hypotheses. Firstly, CI is present in patients with a good clinical evolution (low EDSS: 0-3). Secondly, treatment with GA could be a modulator of OS and may protect against CI in patients with MS.
Participants and Methods: An exploratory, multicentre, cross-sectional study was conducted in a total of three (1:1:1) groups; these included 41 treated patients, 42 untreated patients and 42 healthy controls (HC). To evaluate cognition, all three groups were submitted to a neuropsychological evaluation consisting of an Intelligence test; the Brief Repeatable Battery test (BRB-N); and the COWA, FAS, and Trail Making Test (TMT). The redox status of the plasma was estimated using FRAP calculation, ABTS, uric acid and lactate levels. The cohort included patients with RRMS and disability scores of between 0-3.0 on the EDSS scale with an MS evolution of five or more years.
Results: The results showed that there were differences in cognition between MS patients with a good evolution and healthy controls. Despite their similar characteristics, the MS patients presented worse levels of performance in all the cognitive domains that were explored. When we tried to find differences between the groups, we observed that the treated patients were more similar to the controls than the untreated ones, although the differences were not statistically significant. Regarding oxidative stress, no significant differences were found between groups, but the treated group again exhibited similar parameters to the control group. When we analysed differences between cognitive impairment and cognitive preserved patients, we saw that lactate was the oxidative marker for cognition and that it was more abundant in the control and treated patients than in those with CI. This difference was statistically significant.
Conclusions: We confirmed that patients with a good clinical evolution had a greater presence of CI than the normal population and that GA may be a beneficial treatment for cognition and oxidation: the treated group behaved similarly to the control group, in cognition and OS parameters.

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33 Neuropsychological Rehabilitation on Multiple Sclerosis Patients: Long-Term Results from a Controlled Trial

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Objective: Cognitive difficulties in Multiple Sclerosis (MS) are important contributors to impairment in instrumental activities of daily living. A non-randomized controlled trial was conducted to explore the effects of a cognitive rehabilitation protocol on MS patients' daily life functionality.
Participants and Methods: Seventy-five relapsing-and-remitting MS patients were recruited. Intervention Group (IG, n=31) underwent 16 individual rehabilitation sessions (1hx2/week; weeks 2-10), which included paper and pencil cognitive stimulation exercises and training memory strategies and external memory aids; and a booster session (week 37). Due to COVID-19 pandemic restrictions, only 14 participants of the Intervention group received the experimental treatment face-to-face (Face-to-Face subgroup); for the remaining 17 participants it was conducted digitally through an online platform - Zoom (Online subgroup).

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The IG received the experimental treatment in addition to usual care. Control Group (CG, n=44) received care as usual. Both studied groups were followed prospectively and investigated concurrently. The primary outcome measures were: Multiple Sclerosis Neuropsychological Screening Questionnaire (MSNQ), Mental Slowness Questionnaire (MSQ), and Mental Slowness Observation Test (MSOT). Modified Fatigue Impact Scale (MFIS), and Hospital Anxiety and Depression Scale (HADS) were secondary outcome measures. These measures were applied at baseline and at weeks 11 (post-intervention) and 36 (6 months follow-up). Score differences from baseline were calculated. Linear regressions fitted with generalized estimating equations (GEE) were performed to verify the effects of time and group on the outcome measures.
Results: IG (68% women, medians: age=43 years, education=12 years, age at disease onset=29 years, disease duration=12 years, EDSS=2.5) and CG (68% women, medians: age=40, education=16 years, age at disease onset=27 years, disease duration=8 years, EDSS=2.3) had similar demographic and clinical characteristics at baseline. IG showed increasing improvement at follow-up on MSQ (group x time effect: $p=0.005$), HADS-Anxiety (group x time effect: $p=0.009$), and HADS-Depression score (group x time effect: $p<0.001$), whereas CG did not. IG also demonstrated sustained gains from baseline at weeks 11 or 36 on MSNQ (group effect: $p<0.001$), MFIS (group effect: $p<0.001$) and MSOT - Score (group effect: $p=0.001$) and Time (group effect: $p<0.001$), whereas CG did not. The Face-to-Face and the Online intervention subgroups had similar improvement on all outcome measures, except the MSOT-Time. In this measure, the Face-to-Face subgroup showed increasing improvement, whereas the Online subgroup's improvement at weeks 11 and 36 was relatively stable (subgroup x time effect: $p=0.003$).
Conclusion: Combining restorative techniques with strategy-based compensatory techniques produced significant and persistent effects on MS patients' self-reported everyday functioning and on objective performance of instrumental tasks. There were also positive effects on patients' psychopathology and fatigue symptoms. The use of a video communications platform for individual neuropsychological rehabilitation can be beneficial, though a Face-to-Face intervention appears to be more advantageous.

34 Aerobic Capacity and Strength are Related to Cognitive Functioning in Chronic Stroke Patients

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Objective: People who have suffered a stroke often have low physical activity levels, reduced cardiovascular fitness, and poor strength, balance, and flexibility. It is not fully understood how these components of fitness relate to post-stroke cognitive performance and the biological mechanisms by which they occur. We aimed to: (1) explore the potential associations between physical fitness and cognitive performance, and (2) study the potential mediation effects of cardiovascular risk factors (i.e., determine whether cardiovascular risk factors partially or fully explain the relationship between fitness and cognition).
Participants and Methods: We used baseline data from the MindFit Project randomized clinical trial (NCT04759950). The sample consisted of 141 participants (52 women; mean age 57.87 ± 11.25 years) with a stroke diagnosis (41 hemorrhagic; mean time after stroke 29.29 ± 20.69 months). We selected a subset of tests from a larger neuropsychological battery and calculated three cognitive domains by adding z-sample scores: attention-speed, executive functions, and verbal memory. Physical fitness (i.e., aerobic capacity, strength, flexibility, and balance) was evaluated with an adapted version of the Senior Fitness Test. Finally, anthropometric measures were acquired, and a standard blood test quantified hemogram, biochemical parameters, and lipidic profile.

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Results: Linear regression models revealed that aerobic capacity and upper and lower-limb strength were statistically related to the composites of attention-speed, executive functions, and verbal memory after adjusting for sex, age, years of education, time since stroke, and modified Rankin Scale score. Even though different vascular risk factors (e.g., glucose, cholesterol) were associated with cognitive functioning, none showed significant indirect effects in the mediation analyses.
Conclusions: We provide crossectional evidence of the positive association of a better physical fitness state with post-stroke cognitive performance. These relationships could be explained by a plethora of interrelated biological mechanisms (i.e., metabolic, immune, cardiovascular, neuroendocrine) rather than an isolated traditional cardiovascular risk parameter. Further analyses of the MindFit Project will deepen these associations, including data on circulating growth factors, inflammatory and stress molecules, gut microbiome species, and structural and functional neuroimaging.

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35 Cognitive Reserve and its Relationship to Cognitive Functioning in a Chronic Stroke Sample

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Objective: Post-stroke cognitive impairment is highly prevalent, though there is considerable variability in post-stroke cognitive recovery. One possible factor contributing to these individual differences is cognitive reserve. Cognitive reserve can be defined as the differences in cognitive processes as a function of engagement in intellectual activities and other environmental factors over a lifetime that can explain differences in functional impairment susceptibility in the presence of neurological insult (e.g., stroke) or pathology (Barulli & Stern, 2013). The role of cognitive reserve in cognitive impairment trajectories remains unclear. We aimed to investigate how cognitive reserve relates to domain-specific cognitive impairment long term after stroke.
Participants & Methods: This study utilizes data that was collected as part of OX-CHRONIC, a longitudinal stroke cohort. One hundred and five adults with stroke were recruited (58.5% male; mean age 68.9 (*SD*=13.0); 68.9 % Ischemic stroke, mean NIHSS 7.3 (*SD*=6.1); average time post-stroke = 4.5 years (range 2-9). Cognitive functioning was assessed using the Oxford Cognitive Screen (OCS). Cognitive reserve was assessed using the Cognitive Reserve Index (CRIq), measuring years of education, years in varying occupational positions, and years of frequent engagement in varying leisure activities.
Results: Using complete case analysis, participants were observed to be impaired on an average of 0.67 tasks (range = 0 - 5) on the OCS. Participants had an average of 14.17 years (*SD*=10.58) of educational activity, 33.21 years (*SD*=22.83) of occupation activity and 30.41 years (*SD*=14.44) of frequent leisure activity. There was a significant correlation between engagement in leisure activities and executive function impairment, (r_t = -.32, p= .009) and between years of education and executive function impairment, (r_t = -.30, p = .01). We found no evidence for a significant relationship between engagement in leisure activities or years of education and impairment in any of the other OCS domains.
Conclusions: Based on our preliminary analyses, cognitive reserve may be particularly relevant to executive function outcomes long-term post-stroke relative to other cognitive domains. The results of this study could have clinical applications in predicting cognitive trajectories.

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36 Recovery of Cognitive Functioning Following Aneurysmal and Angiographically Negative Subarachnoid Hemorrhage

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Objective: Studies on recovery after a subarachnoid hemorrhage (SAH) usually investigate motor and other neurological outcomes only, using for example the modified Ranking Scale (mRS) or Glasgow Coma Scale (GCS). However, previous research has consistently found cognitive deficits in this patient group that often go undetected by the mRS and GCS. Although much research is

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devoted to examining these cognitive deficits, research on cognitive recovery after SAH is scarce and, up to now, only conducted in aneurysmal SAH (aSAH) patients. Moreover, the time course of recovery in previous research was up to a maximum of 15 months post ictus. The current study is the first to longitudinally investigate the time course of cognitive recovery and psychological functioning after SAH by means of a comprehensive neuropsychological examination, separately for patients with aSAH and angiographically negative SAH (anSAH).
Participants and Methods: 58 aSAH and 22 anSAH patients were included in this study. Cognition was measured with validated and standardized neuropsychological tests across multiple domains, including memory (15 Words Test, Digit Span Backward), psychomotor speed (Trail Making Test A and B, Stroop Word, Stroop Color, Digit Span Forward), and executive functioning (EF; Zoo Map, Letter Fluency, Stroop Color-Word). Recovery was investigated by comparing cognitive and psychological functioning between the subacute (±3 to ±6 months) and chronic stage (±2 to ±4 years) post ictus, using Student's paired sample t-tests or Wilcoxon Signed Rank tests. Test performances below the 10th percentile, compared to age and education matched normative values as used in clinical practice, were considered to be impaired.
Results: aSAH patients showed significant improvements on two subtests measuring memory, effect sizes were moderate. However, at the chronic stage post ictus, 67% of aSAH patients still showed memory impairments. On the contrary, anSAH patients had significantly lower scores on subtests measuring psychomotor speed at the chronic stage post ictus as compared to the subacute stage. Furthermore, at the chronic stage, 84% of aSAH patients and 86% of anSAH patients showed deviated performances on at least one subtest.
Conclusions: The present findings show minimal recovery of cognitive functioning between the subacute and chronic stage in aSAH patients and no recovery in anSAH patients. This implies that measurement of cognition at the subacute stage post ictus is a reliable indication of functioning in the long term. Moreover, cognitive impairment is still present in a large percentage of patients in the chronic stage, which indicates that SAH results in persistent cognitive impairments. Of note, our findings indicate that aSAH and anSAH patients show different patterns of cognitive recovery, but this must be interpreted with caution since the group size of anSAH patients is relatively small. A timely investigation by means of a comprehensive neuropsychological examination is of great value for the identification of residual cognitive impairments post aSAH and anSAH and also to make patients aware of their deficits. For clinical practice, it may be beneficial to provide SAH patients with appropriate (psychoeducational) interventions.

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37 Delineating a Cognitive Phenotype of Chronic Post-Stroke Fatigue

Chloe Carrick[1] , Andrea Kusec[1] , Elise Milosevich[1] , Pippa Watson[1] , Evangeline Grace Chiu[1] , Nele Demeyere[1]

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Objective: Post-stroke fatigue (PSF) is a debilitating post-stroke symptom, often persisting into the chronic stages of stroke. Notably, the cognitive underpinnings of PSF remain poorly understood. Prior research investigating how cognition and PSF are interrelated have tended to use domain-general measures of cognition, rather than examining cognitive function within specific cognitive domains. It is unknown whether specific domains are more impaired than others among those with PSF. In traumatic brain injury, the "coping hypothesis" of fatigue, posits that fatigue is the result of compensatory effort required to mitigate impairments in attention, executive functioning, and working memory. It is possible that similar cognitive impairments give rise to the genesis of fatigue in stroke. However, there is a dearth of evidence beyond the acute stages of stroke. This study aims to investigate whether cognitive impairments in the domains of attention, executive functioning, and working memory significantly contribute to the severity of chronic PSF.
Participants and Methods: This is a cross-sectional observational cohort study leveraging data from OX-CHRONIC, a longitudinal study on the long-term cognitive and psychological outcomes of stroke. Participants (N = 105) had a mean age of 72.9 years (SD = 12.5) and were approximately 4.55 years post-stroke (SD = 2.14). Self-reported fatigue was measured using the Fatigue Severity Scale. Cognitive functioning in the domains of attention, executive functioning, and working memory were assessed using the Hearts Cancellation subtest of the Oxford Cognitive Screen, the Trail Making Test Part B, and the Digit Span Backwards task. To determine the unique contribution of the above domains to PSF, domain-specific measures of episodic memory (The Logical Memory subtest, Part 2 of the Wechsler Memory Scale) and language (The

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Boston Naming Test) were included in analyses. Additional covariates included self-reported depression symptoms, age, sex, time since stroke, and acute stroke severity.
Results: Multiple linear regression analyses were conducted using both complete case analysis and multiple imputation across five imputed datasets for missing data. In a multiple linear regression using complete case analysis ($N = 54$), depressive symptoms emerged as the only significant predictor of severity of chronic PSF ($\beta = 1.95$, SE = 0.62, $p = 0.002$). In addition, when using a pooled estimate of the five imputations for missing data ($N = 105$), both depressive symptoms ($\beta = 1.80$, SE = 0.35, $p < .001$) and total accuracy scores on the Trail Making Test Part B ($\beta = -0.59$, SE = 0.28, $p = 0.037$), were associated with severity of chronic PSF.
Conclusions: In the chronic stages of stroke, executive functioning was found to be the only cognitive domain associated with PSF. In addition, depressive symptomatology was an important contributing factor to the aetiology of chronic PSF.

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38 Comparing Apparent Diffusion Coefficients and Cognitive Outcomes in Children with Cardioembolic Stroke

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Objective: To demonstrate that children with a history of cardioembolic stroke have abnormal cerebral perfusion in the contralesional hemisphere. We also aim to demonstrate a gradient of apparent diffusion coefficient (ADC) values that are associated with a spectrum of cognitive outcomes.
Participants and Methods: Patients enrolled in the Hospital for Sick Children Stroke Registry in Toronto, Canada from 2003-2017 were screened for eligibility. Children with a diagnosis of congenital heart disease (CHD) and a history of neonatal or childhood arterial ischemic stroke (AIS) were included in the analysis if the acute diagnostic MRI scan was taken up to 10 days post-stroke. Patients must have also had a neuropsychological assessment. Diffusion weighted imaging was assessed for each subject and further analyzed to collect ADC values in both brain hemispheres. ADC values were compared with neurocognitive measures testing executive function and intelligence. Evaluations included were the parent version of the Behavior Rating Inventory of Executive Function (BRIEF) test and the Wechsler Intelligence Scale for Children (WISC)/Wechsler Adult Intelligence Scale (WAIS) for older children.
Results: Preliminary results included 3 patients in the cardioembolic stroke cohort and 3 age-matched controls. Two patients had a right-sided single infarct while one had a left-sided single infarct. The ADC values ($mm^2/s \times 10^{-3}$) in both the ipsilesional (M=0.83, SD=0.03) and contralesional (M=0.84, SD=0.05) hemisphere of the stroke patients were elevated compared to controls. The stroke cohort had elevated scores, compared to controls, on all BRIEF subscales and scored below average on the working memory (M=84, SD=3.5) and processing speed (M=87.7, SD=26.4) indexes from the WISC/WAIS tests. Interestingly, WISC/WAIS processing speed and BRIEF global executive composite (M=61, SD=13.5) scores display a spectrum of impairment that correspond to a spectrum of ADCs.
Conclusions: This preliminary data suggests that specific cognitive outcomes may be moderated by global hypoperfusion in the brains of childhood stroke patients. Many patients with congenital heart disease undergo a period of cyanosis due to the pathophysiology of their heart defects prior to correction. Cyanosis may lead to oxidative stress and subsequent damage to the vascular endothelium. This suggests that the mechanism of injury resulting in global hypoperfusion in the brains of CHD patients may be cerebral vascular endothelial dysfunction. Future studies investigating the impact of cerebral vascular endothelial dysfunction and cognitive outcomes would be fundamental in better understanding the mechanism of stroke injury and moderating outcomes.

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39 Relationship between nonverbal Intelligence and Distorted Thoughts towards Women in IPV perpetrators

Noelia Pérez Cámara[1] , Agar Marín Morales[3] , Natalia Hidalgo Ruzzante[1] , Natalia Bueso Izquierdo[2] , María Pérez González[1] , Juan Verdejo Román[1] , Inmaculada Teva Álvarez[1] , Sofía Amaoui[1] , Miguel Pérez García[1]

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Objective: Intimate Partner Violence (IPV) is a global epidemic affecting 30% of women above the age of 15 years during their lifetime (World

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Health Organization, 2017). Prior research focused on cognitive variables related to men who have committed an intimate partner violence crime against women suggests that they showed low scores on measures of attention, working memory, executive functions, and verbal skills (Cohen et al., 2003; Holtzworth-Munroe et al., 2000; Teichner et al., 2001). Moreover, previous studies revealed that IPV perpetrators performed in the low average range across all cognitive tests compared to published normative data and they have a lower Intelligence Quotient compared with non-IPV violent offenders (Fox et al., 2022). Bearing distorted thoughts towards women in mind, these are considered mediating variables of IPV. Research has found a relationship between IPV and the presence of sexism, patriarchal attitudes, and perceived violence as a way to resolve conflicts (Puente-Martínez et al., 2016), which are common characteristics among perpetrators (Bosch and Ferrer, 2013; Guerrero-Molina et al., 2021). Therefore, the goal of this study is to explore the relationship between nonverbal Intelligence and distorted thoughts towards women in perpetrators of IPV against women.
Participants and Methods: A total of 1093 male volunteers convicted of a crime of IPV against a partner or ex-partner of Andalusia (Spain) participated in the study. The Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman, 1990) to measure nonverbal Intelligence and the Inventory of Distorted Thoughts on Women and Violence (IPDMV; Echeburúa & Fernández-Montalvo, 1997) to measure distorted thoughts towards women were used. A linear regression was carried out using the scores of the Matrices task as an independent variable and the distorted thoughts towards women as a dependent variable.
Results: Results showed that there was a negative relationship between nonverbal Intelligence and distorted thoughts towards women [$F(1,1091)=40.04$; $p< .001$].
Conclusions: IPV perpetrators against women who had a lower nonverbal Intelligence showed higher scores on distorted thoughts towards women. These findings have important theoretical and practical implications since they could provide useful information for the design of effective intervention programs aimed at perpetrators, in addition to constituting important aspects in the prevention of intimate partner violence against women.

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40 Silent Scars: Neuropsychological and Functional Consequences of Intimate Partner Violence

Nathalia Quiroz-Molinares[2] , Moises Mebarak-Chams[1] , Carlos Jose De los Reyes Aragon[1]

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[2]Departamento de Psicología. Universidad de la Costa

Objective: This study aimed to assess neuropsychological performance, cortisol levels, and functionality in women who have experienced physical or psychological violence and compare them with a control group.
Participants and Methods: The groups were 1) Women who suffered physical and psychological violence, 2) Women who suffered psychological violence and 3) Women who have not experienced any violence.
Results: It was found significant differences in working memory ($p < 0.033$) and attentional alternation ($p<0,001$) between IPV groups and controls. There were also differences in cortisol levels ($p<0.001$ ES: Large) and functionality ($p = 0.018$ ES: Medium).
Conclusion: This evidence supports the idea that IPV is related to other domains of functioning than physical and psychological, and it also establishes that psychological IPV is as harmful as physical IPV and should be taken into account as a major type of violence that deserves the attention of clinicians lawyers, and policymakers.

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41 My Brain Made Me Do It: Exploring The Potential Involvement Of Head Injuries In Subsequent Criminal Behaviour

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Objective: Research has suggested that many prison inmates have sustained a head injury during childhood and often, this was before committing their first offence (Wald & Helgeson, 2014). Many head injuries damage frontal cortices which are known to still be developing through adolescence. We report two studies in the UK and Italy, that investigated executive functions (EFs) in ex-offenders with the Jansari assessment of Executive Functions (JEF©), an ecologically-valid non-immersive virtual reality task; JEF© has been demonstrated to be sensitive for assessing adults with acquired brain injury (Jansari et al, 2014) and for detecting the impact of recreational drugs

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(Montgomery and colleagues, 2010, 2011, 2012).
Participants and Methods: JEF© resembles a computer game in which the participant has to play the role of an assistant working in a business office performing simple administrative tasks. The task is run on a Windows laptop and takes 35 minutes to administer. Performance is evaluated on eight EF constructs: Planning, Prioritisation, Selective-Thinking, Creative-Thinking, Adaptive-Thinking, Action-Based Prospective Memory (PM), Event-Based PM and Time-Based PM.
Study 1: Sixteen ex-offenders were compared to 30 age-matched non-offenders on JEF©. Level of head injury during childhood was evaluated using a Traumatic Brian Injury (TBI) questionnaire. Study 2: 15 inmates in a drug rehabilitation unit within an Italian prison in Turin were tested with an Italian version of JEF©.
Results: Study 1: A one-way MANOVA on JEF© performance revealed a main effect of group $F(9,36)=21.16$, $p=.009$, Wilks $\lambda= 0.159$, $\acute{\eta}2$ of 0.841 with the power to detect the effect high (1.0); the ex-offenders were significantly impaired on all eight individual constructs. Further, 87% of the ex-offenders had sustained a TBI preceding the age of their first offence and severity of head injury was positively related to difficulty on JEF©. Study 2: Overall, the Italian inmates were significantly impaired relative to matched controls, $F(18, 68)=8.26$, $p<.0005$, Wilk's $\lambda=0.098$, partial $\eta2=.686$ with the power to detect the effect high (1.0). Interestingly, those inmates in the drug rehabilitation programme who reported a TBI performed worse than those who did not, $F(1, 15)=8.43$, $p=.012$, $\eta2=.393$ with a moderate power to detect the main effect (.765); this suggests the possible cumulative effects of a TBI and substance abuse on compromising executive functions.
Conclusions: The results from both studies demonstrate significantly impaired EFs in ex-offenders and a relationship between these and childhood head injuries; the second study further highlights the impact of substance abuse. We suggest that many ex-offenders should be viewed as adults with undiagnosed TBI; neuropsychological rehabilitation techniques should be used with this population to help reduce the high reoffending rates currently found in many countries. A study is underway with a charity in London, Bounce Back, to evaluate individuals who have just been released from prison to understand their impairments and then to apply rehabilitation techniques developed in adult ABI to improve functions; the aim is that by improving executive functions, it may be possible to reduce the cycle of recidivism whereby currently 50% of prisoners reoffend within a year of release.

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42 Comparing Failure Base Rates on the TOMM-1 and Rey-15 in Romanian and Canadian Disability Applicants

Iulia Crisan[1] , Laszlo Erdodi[2]

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[2]University of Windsor, Canada

Objective: The present study investigates the cross-cultural validity of three North-American performance validity indicators (PVTs) by comparing base rates of failure (BRF) in Romanian and Canadian disability applicants.
Participants and Methods: Three PVTs (Test of Memory Malingering Trial 1 [TOMM-1]; Rey Fifteen Item Test free recall [Rey-15 FR]; and Rey FR + Recognition [Rey COMB]) were administered to a heterogeneous Romanian clinical sample (N Ro = 54, 57% male, mean age = 62.8 ± 13.4, mean education = 11.7 ± 3.3) and a similar Canadian sample (N Can = 52, 40.7% male, mean age = 37.9 ± 13, mean education = 11.1 ± 2). While no significant differences in gender ($t = 1.75$, $p = .081$) and education ($t = 1.13$, $p = .262$) were found, age differed significantly between the two samples ($t = 9.7$, $p = .001$). Patients were referred for assessment to determine the severity of their cognitive deficits.
Results: We compared the BRF in both samples, at various cutoffs. BRF on TOMM-1 at ≤ 43 was similar (Ro = 33.3% vs. Can = 40.4%); at ≤40, Ro = 22.2% vs. Can = 25.0%. Likewise, comparable BRF were observed on Rey-15 FR at ≤ 8 (Ro = 7.4% vs. Can = 11.5%) and ≤ 11 (Ro = 27.8% vs. Can = 23.1%). However, the Romanian sample produced significantly higher failure rates on the Rey COMB at variable cutoffs (p <.05), possibly because Romanian patients were significantly older than the Canadian sample.
Conclusion: In line with the rapid proliferation of cross-cultural research on PVTs, our findings offer proof of concept for the cross-cultural validity of the TOMM and Rey-15 FR. At the same time, they serve as a reminder that the generalizability of PVT cutoffs to different populations should not be assumed, but verified empirically. Employing the TOMM as a criterion measure for newly developed PVTs is recommended.

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43 Does the SIMS Measure Feigned Symptomatology? Data from PTSD Patients in Israel

Odelia Elkana[1] , Alon Sigman [1] , Gal Eldar [1] , Yotam Shchori [1] , Yoram Ben-Yehuda [2] , Dan Segev [3] , Baruch Ponarovsky [4]

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Background: The Structured Inventory of Malingering Symptomatology (SIMS) is a stand-alone symptom validity test for the classification of malingerers' psychopathology in the context of litigation processes. Malingering has numerous negative effects on therapist-patient relations, the economy, research, and malingerers as individuals. The SIMS was found to be an effective tool for the classification of malingerers, but multiple findings indicate that it often erroneously classifies true patients as malingerers.
Objective: To investigate the sensitivity and specificity (diagnostic accuracy) of the Hebrew version of the SIMS total score and the SIMS subscales (psychosis, affective disorders, neurological impairment, amnestic disorders, and low intelligence) in Post-Traumatic Stress Disorder (PTSD) patients and control groups.
Participants and Methods: Participants (N=77) were divided into three groups: legitimate PTSD not engaged in a litigation process (N=29, M=47.68, SD=12.70), a "malingering scenario" healthy control group (N=28, M=27.19, SD=2.41), and a healthy control group (N=20, M=32.55, SD=12.62). All the participants completed the SIMS questionnaire to classify malingered symptomatology and the PTSD Checklist-5 (PCL-5) to measure the severity of PTSD.
Results: The SIMS correctly classified the healthy control group (0% false positives) but failed to correctly classify the scenario group (22% false negatives) or the PTSD group (38% false positives).
In the PTSD group, the severity of PTSD symptoms and the SIMS scores were highly correlated: SIMS total score r=0.660; SIMS psychosis scale r=0.473; SIMS affective scale r=0.637; SIMS neurological impairment scale r=0.604 and SIMS amnestic disorders scale r=0.587; all $p< 0.01$).
In the scenario group, the severity of PTSD and the SIMS total score were also correlated (r=0.394; $p< 0.05$).
Conclusion: The Hebrew version of the SIMS did not exhibit robust diagnostic accuracy, and manifested low specificity especially in the classification of legitimate PTSD patients, leading to a high false positive rate. In PTSD participants, the severity of PTSD was highly correlated with the SIMS scores, suggesting that the SIMS may erroneously classify PTSD patients as malingerers simply because they are suffering from high PTSD symptom severity.

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44 Validity Performance in AULA Nesplora Test

Fidel Rebon[1] , Iñigo Altuna[1] , Amaya Lobo[1] , Elena Salillas[2] , Gema Climent[1]

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Performance Validity (PV) is a measure of unusual patterns of performance in neuropsychological assessment tools. Typically these measures are associated with distinguishing performance patterns of individuals who are seeking secondary gain associated with their diagnosis, either in the forensic setting or for financial, employment or treatment benefit. In 1999, (Slick et al., 1999) proposed diagnostic criteria defining psychometric, behavioural and collateral data indicative of possible, probable and definite impairment of cognitive dysfunction, for use in clinical practice and for defining populations for clinical research. Since then, specific tests have been developed to assess such "Malingered Neurocognitive Dysfunction" performance or embedded items or sets of items aimed at detecting simulated performance. Without assessing or eliminating what clinical and behavioural monitoring of inaccuracies in psychometric test data and patient history may lead us to suspect as a source of inconsistency, we will focus on the possibility of creating an indicator of poor or unusual effort in the Aula, Ice Cream, Suite and Aquarium Nesplora tests. The sample for each of the tests is 600 runs of each.
We have implemented Validity performance in all Nesplora tools so that the clinician is informed when results should be taken with caution, as they correspond to unusual patterns, or directly invalid as that performance is impossible. In the case of AULA Nesplora we have implemented this alert and validation of the profile although it is less likely that the target age suggests a secondary benefit (6-16 years), however it can provide an alert to other

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conditions that may indicate an unusual performance in the evaluation of their attention, such as oppositional behaviour, maladaptation to the test, no understanding of the test, or simply non-cooperation and no effort on the part of the child. The aim is to create a validity performance that assesses the effort made in carrying out the test, giving more indications to the clinician of what may have happened during the test.

Slick, Daniel J.; Sherman, Elisabeth M.S.; Iverson, Grant L. (1999). *Diagnostic Criteria for Malingered Neurocognitive Dysfunction: Proposed Standards for Clinical Practice and Research. The Clinical Neuropsychologist (Neuropsychology, Development and Cognition: Section D), 13(4), 545–561.* doi:10.1076/1385-4046(199911)13:04;1-y;ft545

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45 Effects of social security benefits in a performance validity test: clinical population results

Filomena Gomes[1] , Alexandra Gonçalves[1] , Claudia Pinto[1] , Eduarda Almeida[1] , Inês Ferreira[1] , Sara Cavaco[1,2]

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Objective: Potential Social Security benefits can be an external incentive to exaggerate or simulate memory difficulties or to have low levels of commitment in a neuropsychological assessment. The study aimed to explore the effects of potential Social Security benefits in the performance of the Coin in the Hand Test (CITH) in a clinical population.
Participants and Methods: Neuropsychological test results of 1240 adult patients (sex: 53.7% female; age: mean=51.2 years sd=11.5; education: mean=8.7 years, sd=4.6) from Centro Hospitalar Universitário do Porto's (Porto, Portugal) Neuropsychology Unit were reviewed. All subjects performed both CITH and Dementia Rating Scale-2 (DRS-2) as part of the standard neuropsychological assessment protocol, between January 2015 and May 2020. The exclusion criteria were: age>65, education<3 years, and ongoing litigation. Based on the referral description, five clinical groups were derived: progressive cognitive decline (PCD), non-progressive focal neurological event (NPFN), developmental disorder and/or epilepsy (DDE), non-developmental movement disorders (NDMD), and mixed clinical (MC). CITH<9 was considered abnormal performance (a previous experimental study with 211 normal individuals of the same age range revealed that this cut-off had a specificity of 100% and a sensitivity of 98.8% in the detection of feigned memory impairment). DRS-2 test results were adjusted to age and education according to the norms. Potential Social Security benefits – PB (e.g., paid sick leave, disability retirement, unemployment benefits) were identified. Simple and multiple logistic regressions were applied to explore predictors of abnormal CITH.
Results: Abnormal CITH was recorded in 94 (7.6%) patients and PB were identified in 412 (33.2%) patients. The frequency of CITH<9 was: 50/828 (6.0%) in patients without PB and 44/412 (10.7%) with PB; and was present in 29/425 (6.8%) of PCD, 7/125 (5.6%) of NPFN, 16/219 (7.3%) of DDE, 27/157 (17.2%) of NDMD, and 15/314 (4.8%) of MC patients. The odds of having abnormal CITH performance were higher in patients with PB (odds=1.860, 95%: 1.218 , 2.842; p=0.004) and for the NDMD group in comparison to PCD patients (odds=2.836, 95%: 1.619 , 4.967; p<0.001); it also increased with age (odds=1.037, 95%: 1.014 , 1.060; p=0.002), and decreased with education (odds=0.802, 95%: 0.745 , 0.863; p<0.001) and DRS-2 scores (odds=0.648, 95%: 0.595 , 0.706; p<0.001). No significant association with sex (p=0.589) was found. When analyzed as covariates, PB (adjusted odds=1.712, 95%: 1.045 , 2.804; p=0.033), clinical group NDMD (adjusted odds=3.829, 95%: 2.029 , 7.228; p<0.001), education (adjusted odds=0.867, 95%CI: 0.800 , 0.940; p=0.001), and DRS-2 scores (adjusted odds=0.677, 95%CI: 0.615 , 0.745; p<0.001) remained statistically associated with abnormal CITH scores, whereas age (adjusted odds=1.000, 95%CI: 0.971 , 1.030; p=0.995) was no longer significantly related.
Conclusion: The frequency of abnormal CITH test performance was relatively low in our working-age (<65 years) clinic population. The risk of failure in the CITH increased with potential Social Security benefits. Surprisingly, patients with movement disorders had significantly poorer CITH performance than patients from the dementia clinic. Other significant predictors were low education, and poor cognitive performance in a screening measure. The existence of potential Social Security benefits may require additional performance validity testing.

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Plenary Keynote: Alzheimer's Disease or Alzheimer's Diseases? Contemporary Classification and the Role of White Matter Abnormalities

Presenter: Adam Brickman

17:30-18:30h
Friday, July 8, 2022

INS Awards Ceremony

18:30-19:30h
Friday, July 8, 2022

Major Awards

INS Award for Early Career Research- **Dr. Emily Rosenich, Monash University, Australia**

INS Arthur Benton Award for Mid-Career Research- **Dr. Raymond Chan, Institute of Psychology, Chinese Academy of Science, China**

INS Lifetime Research Award- **Dr. Til Wykes, King's College London, UK**

INS Lifetime Education Award- **Carmen Junqué, University of Barcelona, Spain**

Program Awards

INS Post-Doc Fellow research Award- **Agurne Sampedro Calvete** - Cognitive Rehabilitation and Neuroimaging in Schizophrenia

INS Graduate Student Research Award- **Siobhan Shaw** - Anhedonia in Frontotemporal Dementia – Neural Substrates and Functional Implications

INS Memory Disorders Research Award- **Anna Carnes-Vendrell** - Association Between CSF Biomarkers and the Test of Memory Strategies in Mild Cognitive Impairment Patients

INS Marit Korkman Award- **Lexuri Fernández de Gamarra-Oca** - Long-Term Outcomes in Low-Risk Preterm-Born Adolescents and Young Adults

SLC Student Research Awards

Jessica Bruijel (Netherlands) *Task-Induced Subjective Fatigue and Resting-State Striatal Connectivity Following Traumatic Brain Injury*

Marta Godoy Gonzalez (Spain) *Objective and Subjective Cognitive Deficit in COVID-19 Critically Ill Survivors One Year After ICU Discharge*

Emma Segura (Spain) *Enriched Music-Supported Therapy in the Rehabilitation of Patients with Chronic Stroke*

Yolanda Balboa Bandeira (Spain) *Transcranial Electrical Stimulation Techniques Comparison on Foreign Language Learning: a Pilot Study*

Anne Buunk (Netherlands) *Emotion Recognition in Low-Grade Glioma Patients Before and After Surgery*

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