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ARTICLE

Experiences of age-related declining navigation abilities and impact on use of outdoor environments: a qualitative study of young-old adults with self-reported memory difficulties

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Abstract

Laboratory-based experiments show ageing negatively impacts navigation abilities, yet a paucity of research explores lived experience. This exploratory study examined young-old adults' experiences of declining navigation abilities during 16 semi-structured telephone interviews. Findings reveal: (a) 'Behavioural drivers' that underpinned the participants' experiences and actions when engaging with their environments, (b) 'Avoidance' and (c) 'Active' strategies that were adopted by the participants. Declining cognitive function appeared to have a negative impact on participants' perceived abilities and confidence to navigate unfamiliar outdoor environments, which in turn influenced the strategies they chose to adopt. Future psychosocial interventions should draw on neuropsychological theory to ensure retention of navigation skills and confidence for as long as possible.

Keywords: later life; navigation strategies; self-reported memory difficulties; behavioural drivers; neuropsychology; wellbeing

Introduction

Engagement with outdoor environments contributes to wellbeing and quality of life in later life and can be a preventive measure to reduce the risk of dementia (Abbott *et al.*, 2004; Scherder *et al.*, 2005; Larson *et al.*, 2006; Duggan *et al.*, 2008). It is important that older people feel safe when they engage with outdoor environments (Phillips *et al.*, 2013). Understanding more about older people's experiences of outdoor environments and notions of safety therefore underpins wider policy agendas and debates including, ageing in place (Lawton, 1990; Phillips *et al.*, 2013; Rogers *et al.*, 2020) and ageing and

dementia-friendly communities (Alzheimer's Disease International, 2017). Older people's use and experiences of outdoor environments are considered widely amongst different disciplines, *e.g.* gerontology (Phillips *et al.*, 2013), dementia studies (Li *et al.*, 2021), travel behaviour (Burns, 1999; King and Scott-Parker, 2017) and public health (Wang and Lee, 2010; King *et al.*, 2011). There is consensus that as people age, they undertake fewer physical journeys that are shorter in distance (Burns, 1999; Soule, 2005; King and Scott-Parker, 2017) and journeys to familiar places (shops, doctors, *etc.*) increasingly take precedence over those to unfamiliar places, particularly if people develop physical or cognitive impairments (Phillips *et al.*, 2013).

One area that investigated how ageing affects our behaviour of undertaking journeys is travel behaviour research. Car drivers aged 60 and over undertake significantly fewer journeys than those aged 59 or under (Burns, 1999; King and Scott-Parker, 2017; Department for Transport, 2019). However, older car drivers do undertake more journeys (per person, per year) than those who do not drive (Department for Transport, 2019). Older women drive less than older men (Burns, 1999; King and Scott-Parker, 2017; Department for Transport, 2019), as men in these cohorts are more likely to have a driving licence than women (Stanley, 1995). Car drivers are also likely to continue being a passenger in a car or taxi once they give up driving and are less likely to walk or use public transport due to health reasons (King and Scott-Parker, 2017). Trip chaining research looks at the complexity of journeys by defining the different tasks that people undertake during each journey. Interestingly, one study highlights that older people make more complex journeys (more stops per journey) than younger people, even though these journeys tend to be shorter (Su and Bell, 2009).

Existing research identifies multifaceted reasons for declining physical mobility as people age which affects independence and is linked with wider health and well-being, socio-economic status, and access to social networks and cultural capital (Grundy, 2006). One important contributing factor to reduced mobility in older age is age-related decline in navigation abilities which has now been firmly established in experimental research (Lester *et al.*, 2017). In general, older adults find it more difficult to navigate unfamiliar environments than younger adults and associated declines in spatial orientation and navigational skills begin early in the ageing process (Kirasic, 1991; Moffat, 2009; Harris and Wolbers, 2012; Lopez *et al.*, 2018). However, our understanding of how older adults experience such age-related declines in navigation abilities, what coping strategies they develop and how their lives are affected is limited and the main focus of this study.

Some insights into how ageing impacts on people's navigation behaviour comes from driving surveys. Burns (1999) studies the impact of ageing on older driver's journey patterns (Burns, 1999). Specifically, older drivers reported difficulties navigating as it takes them longer to read maps, they miss information on road signs, and fail to gain information from landmarks because of declines in visual acuity and restricted visual field (Burns, 1999). The combination of difficulties navigating with declining physical abilities makes wayfinding so difficult that older drivers have reported that they avoided travelling on unfamiliar journeys (Sixsmith and Sixsmith, 1993) which may contribute to the cessation of driving (Rabbitt *et al.*, 1996).

Older pedestrians report similar patterns of undertaking more familiar and less unfamiliar journeys in outdoor environments (Phillips *et al.*, 2013). Neighbourhood

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design impacts health, physical activity and, therefore, wellbeing and independence. The design of the environment can support or intensify cognitive impairment and physical activity levels (Wang and Lee, 2010; King *et al.*, 2011). Changes in physical and mental health and personal situations causes fluctuations in older people's use of space (Rowles, 1978). For example, familiar spaces may become unfamiliar due to the onset of cognitive impairments, or because environments change through regeneration or decline (Settersten, 1999; Phillips *et al.*, 2013). Older people reported not wanting to go to unfamiliar spaces as this can lead to insecurity, disorientation, fear over personal safety, social exclusion and loss of independence (Phillips *et al.*, 2013). Therefore, to maintain self-respect and dignity it is important to minimise the number of instances that older individuals become 'lost' (Lynch, 1960; Ohta, 1983). Older people do not wish to appear 'confused' when they are uncertain about an unfamiliar environment (Remnet, 1981), and have suggested that fear of disorientation has stopped them from using public buildings (Foster *et al.*, 1998).

For those with dementia, the notion of the 'shrinking world' suggests that declining memory, confusion, disorientation, reduced confidence and anxiety all contribute to reducing outdoor activity. The 'shrinking world' leads to a loss of independence and control for the person with dementia and may increase the risk of depression that dementia already poses (Paterniti *et al.*, 2002). Duggan *et al.* (2008) interviewed family carers who identified significant changes in outdoor lives, whereas people with dementia did not seem aware of the changes, instead tending to reminiscence about activities they used to do. However, the notion of the 'shrinking world' has been contested, as people with dementia often make new friends, use technology to overcome geographical boundaries and engage in their communities differently to before diagnosis (Ward *et al.*, 2022).

Insights from neuropsychology: impact of ageing process on navigation abilities

Age-related declines in navigation abilities have been reported for various spatial navigation and wayfinding tasks (Lester *et al.*, 2017), including everyday tasks such as learning novel routes (O'Malley *et al.*, 2018) or unfamiliar environments (Iaria *et al.*, 2009), which may have important implications for older people's independence. While abnormal or atypical ageing (Woods, 2011), especially mild cognitive impairment (Petersen, 2016) and Alzheimer's disease (Wenk, 2003), has devastating effects on people's ability to navigate successfully (Cushman *et al.*, 2008; Lithfous *et al.*, 2013; Serino *et al.*, 2014), already earliest signs of atypical ageing have a substantial impact on navigation abilities (O'Malley *et al.*, 2018). Given that spatial disorientation is one of the earliest signs of Alzheimer's disease (Pai and Jacobs, 2004) and that Alzheimer's disease-related navigation deficits are so reliable and specific for this type of dementia (Pengas *et al.*, 2010), navigation tests are now being developed and considered as tools to support the differential and early diagnosis of atypical ageing (Kunz *et al.*, 2015; Coughlan *et al.*, 2019).

Most of our understanding of how typical and atypical ageing affect navigation and wayfinding abilities comes from laboratory experiments. While this experimental approach is particularly suited to isolate single factors that contribute to age-related declines in navigation abilities and to unveil the intricacies of the ageing navigation system, it is not clear how results from these laboratory experiments

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translate to people's every navigation experiences. This is partly because current navigation experiments are often carried out in minimalistic virtual environments that allow for complete control over the stimuli presented and that can be designed to match the experimental demands exactly (Wiener *et al.*, 2020). Controlled experiments are designed to investigate specific cause–effect relationships but can never capture the complexity of real-world navigation. For example, navigators in the real world may have access to navigation aids (maps, satellite navigation systems (satnavs), signage, *etc.*) that can ameliorate some of the effects of age-related declines in abilities. Moreover, people may employ coping strategies or decide not to engage in certain types of navigation activities. It is therefore unclear how findings from laboratory-based studies translate to everyday navigation experiences. We will address this issue in this study.

Understanding the lived experience of age-related declining navigation abilities and impact on everyday life

In a survey exploring navigation and mobility in older age, respondents reported that they found navigation and wayfinding more difficult with increasing age and that they tend to avoid unfamiliar environments (Burns, 1999). However, to examine how age-related declines in navigation abilities affect people's experiences and the impact on their everyday life, a qualitative approach is needed. So far, only a few qualitative studies have focused on ageing and navigation (O'Malley *et al.*, 2018, 2022). The findings of these studies link closely to cognitive theories of navigation and therefore underline the potential of qualitative approaches to support existing studies into the effects of ageing on navigation which are predominately quantitative (*e.g.* Wiener *et al.*, 2020). These previous studies focused on environmental design features that either support or hinder spatial orientation and navigation. O'Malley *et al.* (2018) interviewed older adults with memory complaints or dementia living in a residential development to explore how they find their way around. Participants stressed the importance of environmental design and favoured memorable and meaningful spaces over wayfinding signage and 'You Are Here' maps. In a second study, O'Malley *et al.* (2022) asked older adults to learn a novel route through an unfamiliar residential development. In subsequent interviews, participants reported that they used visual landmarks and structural cues to remember the routes. Participants reported that repetitive design, long corridors and the lack of landmarks (salient environmental cues) as main reasons for disorientation. Whilst these reasons could also hold true for younger navigators, the studies again highlight that people's navigation experiences are closely linked to (neuro-)psychological theories and therefore highlights that qualitative approaches can make important contributions to our understanding of how age-related declines of navigation abilities and associated experiences affect people's lives.

Study aim and objectives

The aim of this exploratory interview study was to develop a better understanding of how young-old adults experience age-related declines in navigation abilities, and how these declines affect their everyday lives, and their perceived independence and

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wellbeing. The main focus was on navigation in outdoor environments and on young-old adults (aged between 65 and 74 years old) which was, in part, the result of our recruitment strategy. Participants were recruited initially through researchers' existing contacts and then using snowballing. Participants were also required to be living independently and take part in activities of daily living (*see* detailed inclusion criteria below). This resulted in a sample of young-old participants which is ideally suited to explore experiences of early age-related navigation difficulties in this specific period of later life, when individuals are generally still more active (Burns, 1999; Soule, 2005; Phillips *et al*., 2013; King and Scott-Parker, 2017).

The specific research questions were:

- What are young-old adults' experiences of living with declining navigation abilities?
- Are young-old adults aware of age-related declines in navigation abilities?
- How do young-old adults cope with declining navigation abilities and do they put compensation/coping strategies in place?
- Do declining abilities to navigate outdoor environments affect young-old adults' perceptions of independence and wellbeing?

Findings from this study will shed light on the lived experience of ageing and navigation and the impact of physical and cognitive changes on people's everyday lives. Enabling older people's navigation and orientation in unfamiliar environments is essential to policy objectives, such as ageing in place (Rogers *et al*., 2020), ageing and dementia-friendly communities (Alzheimer's Disease International, 2017), person in environment theory (Lawton, 1990) and the development of 'place attachment' (Phillips *et al*., 2013). If outdoor environments were designed to take account of such experiences, then this may help to support the continued use of such environments as older adults age.

Research approach

This study used a descriptive qualitative approach with semi-structured telephone interviews.

Participant recruitment

Participants were recruited using purposive sampling strategies, as inclusion criteria were based on specific characteristics and demands for the research questions. Participants had to:

(1) Be aged above 65 years old.
(2) Be independent, meaning that they were living independently and able to care for themselves and perform activities of daily living and not be diagnosed with dementia or mild cognitive impairment (d'Orsi *et al*., 2014).
(3) Have self-reported memory difficulties (Palinkas *et al*., 2013), including *e.g.* finding it harder to find personal possessions, recall recent family events, or remember appointments, street names or places visited.

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Table 1. Participant characteristics

Participant number	Gender	Age (years)	Current residence in the United Kingdom		Interview length (minutes)
			Region	Place	
1	Female	69	Midlands	Birmingham	14
2	Female	71	South West	Ringwood	17
3	Male	67	South West	Devizes	11
4	Female	68	South East	London	14
5	Male	73	South West	Westbury	10
6	Female	74	South West	Plymouth	11
7	Female	70	South West	Bath	13
8	Female	68	North West	Manchester	11
9	Female	72	South West	Plymouth	12
10	Female	74	South East	Southampton	20
11	Female	72	Scotland	Edinburgh	40
12	Female	68	South East	London	23
13	Male	68	South East	Hampshire	21
14	Female	68	North West	Liverpool	18
15	Male	65	North West	Cumbria	22
16	Male	65	South East	Southampton	26

Participants were recruited initially through researchers' existing contacts and then using snowballing. Anyone who expressed an interest in taking part was emailed information about the study and given an opportunity to ask any questions before deciding whether to participate. Sixteen participants took part in this study, 69 per cent (N = 11) were female and 31 per cent male (N = 5) (Table 1). The mean age was 69.5 years (standard deviation = 1.41). Participants were recruited until data saturation was reached. Participants were geographically spread across the United Kingdom (UK).

Method

Semi-structured telephone interviews were conducted to ascertain the required qualitative data. The interviews were conducted by the third and fourth authors and ranged from 9 to 40 minutes (average 17 minutes), excluding the consent processes. Prior to the interviews, participants were emailed a participant information sheet and agreement form which they were asked to sign and return. Once the signed participant agreement form was received, each participant was emailed a list of interview dates and times and asked to pick the most convenient one for them. Interview questions were divided into three parts: (a) participants described where they lived and how they travelled within this environment; (b) participants

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explored experiences of orientation and navigation in familiar and unfamiliar environments (*e.g.* 'How would you describe your experiences when navigating a familiar environment?'; 'How do you stay orientated in an environment that you are not used to?'); (c) participants were asked to reflect on if/how they felt their orientation navigation abilities had changed in the last few years. After the first interview it was noted that the participant mainly discussed experiences of driving, and so an additional question 'Whilst walking in a familiar environment have you ever got lost or disorientated?' and appropriate prompts 'How about when walking?' were added to the interview schedule.

Ethics and consent

Ethical approval was obtained from Bournemouth University Research Ethics Committee prior to the start of data collection. Principles of informed consent, voluntary participation, the right to withdraw, confidentiality and anonymity were adhered to. All participants were able to provide informed consent. Responses to telephone interview questions were audio recorded to capture the data more effectively (Jamshed, 2014). All interviews were transcribed verbatim by the third and fourth authors. All participants answered all questions, and no one withdrew from the study. Once the interviews were transcribed the audio recordings were deleted and all identifiers were removed from transcripts prior to analysis.

Data analysis

Data were analysed using an inductive six-phase thematic approach, as outlined by Braun and Clarke (2006). This was undertaken by all authors who individually conducted the initial stages and met several times to review and discuss the emerging themes, until consensus was reached. During the process detailed discussions were undertaken between the authors to provide rigour to the analysis. Analysis was co-ordinated and written up by the second author using key quotations from the participants to support the themes and demonstrate lived experience.

Findings

Three themes were inductively constructed from the data. The first concerned the 'Behavioural drivers' that underpinned the participants' experiences and actions when engaging with their environments. Examining these provided important insights to contextualise and better understand the strategies the participants subsequently employed to navigate and orientate themselves. The second and third themes outlined the 'Avoidance' and 'Active' strategies that were adopted by the participants. All themes and sub-themes are discussed below, key quotations to support in the participants own words are outlined in Table 2.

Behavioural drivers

Participants described a range of types of places that they visited. Often, they would walk to familiar places which they described as local shops, libraries, public houses,

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Table 2. Participant quotations

Theme	Sub-theme	Quote number	Participants words
Behavioural drivers	Detrimental impact of ageing	1	'I get quite stressed out if I don't know where I'm going so I don't like to have the radio on or people distracting me, because if it's a new place I'm going to, I need to fully concentrate on the road signs or the satnav [satellite navigation system].' (Participant 1)
		2	'Yeah, I still do them okay [navigate and orientate], I think it just gets tiring a bit more now, as you get older. You need to concentrate a lot more, especially with cars on the roads nowadays, trying to cut you up and things like that, and lorries as well.' (Participant 16)
		3	'Well … your brain does lose a little bit of it as you get older … You tend to forget the name of a road, or you think oh I will take this road and then you think oh I shouldn't have taken this one it was the next right.' (Participant 16)
		4	'Well, now I'm elderly, I'm more mindful of where I go. I like to make sure I'm safe and think about my wellbeing. I don't do all the trips I used to do, all those years ago, but I think I do quite well.' (Participant 10)
		5	'My skills have to a certain extent in the last six years have improved because I now travel on my own and it's very difficult to read a map and drive at the same time … if I'm not able to navigate to somewhere and … be confident to do it, I wouldn't go anywhere because I live on my own and my daughter lives in [name of place], so I have to get there.' (Participant 11)
	Environmental context	6	'It's a bit different [with my confidence] because I am more used to the roads down there as I spent a lot of my life living there and I more or less know it like the back of my hand.' (Participant 2)
		7	'Yeah, I think it gets a bit confusing sometimes if you're in the evenings. It's dark. You get very confused and disorientated with where you're going and heading for. Lights coming into your face, things like that. I find are the negative side of it sometimes. It used to be better years ago.' (Participant 16)
		8	'I got lost getting to the hotel I was staying at. I got off the train in the evening and it was dark and I was using Google Maps on my phone which I normally get on with but I think because it was dark I couldn't see the street names very well and took a couple of wrong turns, it was raining and I felt all rushed and it was getting all hectic I just wanted to get to the hotel.' (Participant 3)

	Previous life experience	9	'I once got lost in the forest … I got distracted and stopped paying attention and got lost in the middle of the woods with my dog, which was very distressing, I just kept thinking that I would never find my way back.' (Participant 2)
Avoidance strategies	Avoiding new areas	10	'I don't really like going to new places alone because I know I'm so bad at getting around.' (Participant 4).
		11	'I used to drive up to [name of place] about once a year, but I would time it when it wasn't foggy. There's a certain time of year when it can get very foggy up there so I steer clear of that, I will absolutely not drive in the fog, it scares me.' (Participant 2)
	Handing over responsibility to others	12	'Well normally when I'm with the family I just followed them round where they are going and just try not to lose them.' (Participant 10)
		13	'My daughter is good on her phone and good at driving and getting around, so I sort of rely on her I suppose.' (Participant 4)
		14	'No, I don't tend to walk around when its dark, if it's dark and we're out we will usually get a taxi home.' (Participant 5)
		15	'I don't go to as many new places as I would like, because I don't want to go alone … I don't have the confidence to do it, so I guess it has impacted on my independence but not my wellbeing.' (Participant 7)
Active strategies	Preparatory strategies	16	'I tend to plan everything … the trips we are going take, where they are in relation to the hotel, I spend many hours looking around the area on Google Maps and almost get used to it.' (Participant 8)
		17	'…would have looked for ways on Google for how to drive down. I would look again at local maps and online. I also love looking at maps so I would print off a map so that I could look at it and I've got maps in the car and things.' (Participant 12)
	In the moment strategies	18	'I didn't know how to get back, so I just went the way I came, retraced my footsteps.' (Participant 6)
		19	'There's the old-fashioned way of finding something that you do recognise and looking at where the sun is and trying to work out what direction everything is in.' (Participant 15)
		20	

(*Continued*)

Table 2. (*Continued.*)

Theme	Sub-theme	Quote number	Participants words
			'We will use the landmarks around to know where we are, like up on [name of place] when it's open they have old helicopters and big towers and barns, so we know where we are when we see them.' (Participant 3)
		21	'… if we got lost, we would just ask someone, and they would know.' (Participant 5)
		22	'I had taken the dog out on a walk to the forest, and I must have misremembered the route and we ended up going down a new area and at the time I didn't think anything of it. But when it started to get dark I started to get flustered and just wanted to get back to the car so we went back on ourselves but again I must have taken a wrong turn because it took a lot longer than usual.' (Participant 2)
		23	'I am sick and tired of anyone who follows a satnav … satnavs just don't always take you where you want to go and it's better to find your own way using a more traditional map … I'm watching the satnav and my husband is following it and I think it's wrong it's definitely wrong we're not going to be going in the right direction, it might raise my blood pressure ever so slightly. All you get on a satnav is a place in time where you are right now, but if you look at a map and you can see where you are, you see it in the context of where everything else is.' (Participant 14)

family or friends' houses, parks and woodland areas for dog walks and feeding ducks. Conversely, they would typically drive to unfamiliar places such as hospital appointments, holidays, out-of-town shopping centres and to see friends or family who did not live locally to them. Familiar environments seemed to equate to places that the participants would be likely to visit every day (such as the local shops, family member's house, local park) whilst unfamiliar environments were places participants visited less frequently or had never been to before (such as hospital or holiday destination). Participants were cognisant of a range of factors they now encountered as young-old adults that influenced their perceived abilities, confidence and, ultimately, their overall psychological wellbeing as they navigated in their external environment. These were interlinked and associated with the cognitive and physical impacts of ageing, the environmental context and their previous life experience.

Detrimental impact of ageing

Most participants recognised that the ageing process had detrimentally impacted on their cognitive and physical abilities which, in turn, had adversely affected their abilities and confidence when orientating and navigating themselves. Many acknowledged that they were now 'not quite as sharp as they used to be' (Participant 15) and had to dedicate more cognitive resources to wayfinding and navigation processes. Consequently, although they could still successfully accomplish these tasks, they were often slower to do so than they had been in their younger years, and they were required to concentrate harder and remove all distractions to prevent themselves becoming disorientated. This was particularly the case in unfamiliar environments (quote 1). As another participant discussed, even though they felt they were able to navigate and orientate as well as in their younger years, the additional cognitive effort that was required now to manage these mental challenges was very tiring (quote 2).

Other participants reflected on how the ageing process could make them more forgetful on occasions and so they could become disorientated, even on familiar routes. This coupled with a decline in their physical abilities (such as their eyesight and movement) resulted in them taking 'longer to get to places now' (Participant 12) (quote 3). There was a sense that the detrimental impacts of ageing on participants' cognitive and physical abilities resulted in emotional distress and greater psychological feelings of vulnerability when participants were required to navigate environments. This could adversely affect their confidence and willingness to do so (quote 4).

Interestingly, counter to the common narrative, two participants perceived that their orientation and navigation skills had improved as they aged; both discussing a willingness and confidence to continue to engage with their external environment on their own. For one participant, this was necessitated by the death of her husband (who previously was responsible for most of the orientation and navigation tasks) and her desire to remain socially included (quote 5). Throughout the interview she discussed the importance of continuing to test herself with her orientation and navigation skills and described how she lived by the mantra: 'use it or lose it' (Participant 11).

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Environmental context

The environmental context interacted with the cognitive and physical impacts of the ageing process to either enhance or inhibit participants' confidence and abilities when engaging with their environment. A few participants commented that their willingness to engage with their community and/or use public transport had decreased recently due to the COVID-19 virus. The majority, however, discussed continuing to interact with their environment in ways like they had in their younger years. Choice of mode of transport varied based on factors such as the purpose and length of their journey, the accessibility and availability of public transport, the amount of traffic and ease of parking at their destination, or if they were having a 'lazy day' (Participant 2).

Generally, all the participants discussed feeling more capable, confident and at ease when navigating familiar routes and this was important for their overall sense of wellbeing as they interacted with the environment. These familiar routes consisted of those that were local to their homes, those they regularly travelled when visiting friends and family living further afield, or those they were accustomed to from their younger years (quote 6). However, participants also discussed how the environment could adversely impact on their perceived navigation and orientation abilities and confidence. Many reported that the weather and the light now played an important role in influencing their current experiences of outdoor environments. They highlighted how they found it more difficult in their older years to orientate themselves when it was dark (quote 7).

These challenges were exacerbated when it was raining or overcast, meaning participants were required to place more cognitive effort into orientating and navigating themselves. For some, this environmental context was 'unnerving' (Participant 12) and made them feel more vulnerable now that they were older, and this had a detrimental impact on their wellbeing (quote 8).

Previous life experience

Participants' previous life experiences associated with their job and/or family roles, as well as their hobbies and interests, influenced their current experiences and confidence when navigating their environments. For instance, one participant highlighted how she and her husband had been avid travellers in their younger years and as such she still felt confident exploring and navigating new areas. Another participant discussed how they had been a lorry driver and 'travelled so much in my life … so I know my way around quite a bit' (Participant 16). However, other participants found this more difficult, particularly some of the widowed women who had previously relied on their husbands to undertake most of the driving and navigating, describing feeling less confident in their navigation abilities, particularly in unfamiliar environments.

Coupled with this, all the participants could recall experiences of being lost and disorientated when navigating a range of unfamiliar, and in some instances, familiar environments; whilst on occasions these occurrences were viewed as 'irritating', such as when they discussed losing their sense of direction in an underground car park (Participant 12). It was evident that these instances were psychologically distressing for them as they described feeling 'panicky', 'flustered' and 'anxious' or 'stressed out' and 'scared' (Participant 11). Although some participants recalled

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more recent incidences of being lost, others recounted detailed episodes that occurred several years ago, highlighting the lasting impression it held on them (quote 9).

These highly charged emotional experiences appeared to leave an imprint within participants' memories and evoke a sense of fear around being lost and disorientated. This was particularly pertinent now they were older and recognised their declining navigational abilities. For some participants, the foreboding sense of *feeling* lost rather than actually *being* lost, was enough to affect their psychological wellbeing and subsequent behaviours as they engaged with their environment.

Avoidance strategies

Participants employed multiple strategies to prevent or overcome the feelings of negative psychological wellbeing associated with disorientation and cognitive burden, and to ensure that they felt comfortable and confident when engaging with their external environment. For many participants, these focused on avoiding unfamiliar environments and reducing the amount of responsibility they had for navigation and wayfinding tasks.

Avoiding new areas

Most participants reported choosing to avoid new environments and 'usually go the route I know … that's the way I like to do it best' (Participant 10). This ensured that they felt psychologically safe within their 'comfort zone' (quote 10). This strategy was also employed when participants discussed going on holiday, with many of them highlighting that they visited similar places each year, or when visiting new places, they often chose to navigate areas close to where they were staying. Participants also reported avoiding areas, both familiar and unfamiliar, when there was heavy traffic or their visibility would be restricted such as when it was dark or foggy, as they recognised these scenarios would place more effort on their cognitive resources (quote 11).

This strategy required more advanced planning and appeared to restrict participants on the frequencies and times they would venture out, or the areas they would visit. However, the majority accepted this compromise as it decreased their risk of becoming lost or placing undue stressors on their cognitive abilities, which in turn would detrimentally impact on their psychological wellbeing.

Handing over responsibilities to others

When participants were aware that they may be required to visit unfamiliar environments, such as when they went on holiday or to see friends and family, they reported choosing to hand over the navigation responsibilities to other people whom they trusted; either because they viewed the others' wayfinding abilities as superior to their own, or they recognised and respected their familiarity with the area. This might include family members, tour guides (if on holiday) or taxi drivers. Through making these autonomous decisions, the participants avoided having to take on the navigational responsibilities and cognitive load as well as the stressors to their psychological wellbeing that this could entail (quotes 12 and 13).

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This strategy was also employed by participants when faced with navigating familiar areas at times when it may require more cognitive demands from them. In this instance, the participant chose to avoid the responsibilities for wayfinding and entrust them to the taxi driver who had knowledge of the area (quote 14).

These other people were perceived as being able to take on, or share, the cognitive burden as well as provide a 'confidence boost' (Participant 9) that was beneficial for participants' psychological wellbeing, particularly if they were navigating unfamiliar environments.

It is important to note, however, that employing these strategies means that people, if unaccompanied, may decide against going to new places even if they would like to go (quote 15). This leads to a voluntary restriction of their independence and life experiences.

Active strategies

Throughout the discussions, participants recounted recent situations where they were required to actively engage with their navigational strategies rather than handing over the responsibilities to other people. These strategies were more cognitively demanding and time consuming, and were employed at the planning stage, in anticipation of trips into unfamiliar environments, as well as in-the-moment when participants became disorientated.

Preparatory strategies

Participants reported using active strategies in the planning phase of trips to unfamiliar environments. This included preparing and memorising driving and public transport routes on maps as well as printing out directions that could be followed when navigating new environments. Many participants also discussed the benefits of technology such as Google Maps, which enabled them to visit areas virtually and become accustomed to them prior to physically embarking on the journey (quotes 16 and 17).

It was evident that most participants spent a lot of time and effort in preparing these navigational aids prior to any journeys into unfamiliar environments. In doing this, it appeared that participants recognised the need to plan to compensate for their declining navigational abilities and so reduce the likelihood of becoming lost.

In-the-moment strategies

Throughout discussions, many participants recalled recent situations where they had become disorientated and consequently relied on in-the-moment navigational strategies to orientate themselves. They described a range of strategies they engaged with, and each participant had their own individual preferences. These included: retracing steps, looking for landmarks, asking for directions and celestial navigation (quotes 18–21). These strategies are commonly reported in the wider navigational literature (Head and Isom, 2010; Rodgers *et al.*, 2012; Tomaszewski-Farias *et al.*, 2018), and whilst for most participants they were successful, in some instances, particularly where participants were required to remember and re-trace their route, they were ineffective and detrimental to their wellbeing (quote 22).

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The use of technology in older age is a very complex issue as it relates to wider socio-demographic factors and people's previous occupation and family situation. It is therefore difficult to draw wider conclusions from our small sample. In line with this notion, our participants reported mixed feelings on the use of technology such as satnavs, as an in-the-moment strategy for navigation. Some participants discussed being more open now to using technological devices and saw them as a great 'cheat' (Participant 11), usually in addition to more traditional aids such as printed maps. Others highlighted the challenges technological devices could pose. These often exacerbated the general in-the-moment challenges they faced when navigating and orientating themselves as an older adult. Challenges included the distracting noises from the satnavs, which could place additional cognitive burden on people, and the difficulties seeing the smaller screen particularly in the bright sun. Others also highlighted the psychological distress that could be caused if it took them to the wrong place or on 'very bizarre routes' (Participant 12). As one participant discussed, these challenges meant they were inclined to favour more traditional navigational methods (quote 23).

Discussion

Research suggests that the health and wellbeing of older adults is positively impacted by being outdoors (Abbott *et al*., 2004; Scherder *et al*., 2005; Larson *et al*., 2006; Duggan *et al*., 2008). This exploratory study aimed to understand the lived experience of age-related declining navigation abilities and the impact on use of outdoor environments. The findings demonstrate that the heterogeneity of young-old adults' experiences means that age-related changes in navigation abilities are experienced in different ways. For example, two participants suggested that they had improved their orientation and navigation abilities, whilst the rest rated it as more challenging. That said, most of our young-old participants described similar experiences of orientation and navigation becoming more challenging in the last 15 years. The findings suggest that participants' orientation and navigation challenges were due to three interconnected behavioural drivers: (a) detrimental impact of ageing, (b) environmental conditions, and (c) previous life experience. Understanding more about these behavioural drivers helped to identify the multitude of avoidance and active navigation strategies used by participants.

Fear of being lost contributing to feelings of vulnerability

On the surface, young-old adults with self-reported memory difficulties tended to engage with their community in the same way as before, in terms of selecting transport and going about their familiar activities. However, it was evident that the ageing process had a negative impact on their ability and confidence to navigate outdoor environments, and many demonstrated a desire to avoid feeling or becoming lost. This resulted in many participants reducing their amount of outdoor activity as they aged and placing more reliance on others to support their navigation. Many of our participants described using navigation strategies that avoided them becoming lost, including pre-planning unfamiliar journeys or going with others.

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It appeared that these strategies had developed based on previous experiences where participants had become lost and felt overwhelmed with the situation and did not want to repeat it. This suggests that the 'feeling of being lost' was something that they desperately wished to avoid, like it somehow contributed to their vulnerability (Remnet, 1981; Foster *et al.*, 1998). This is likely to have a detrimental impact on their sense of wellbeing and independence. As others have argued, minimising the number of instances that older adults become 'lost' helps to maintain psychological wellbeing, self-respect and dignity (Lynch, 1960; Ohta, 1983). Moreover, in doing so the participants seemed happy to give up/hand over independence and accept that their world is getting smaller; a stark contrast to other older adults who start to travel and explore the world once they retire (Gibson, 2002). This adds further complexity to arguments outlined in previous research suggesting more emphasis needs to be placed on enabling older adults to participate in good quality urban spaces, if they are to retain their independence and wellbeing as well as take an active role in society (Phillips *et al.*, 2013). Could the difference in the two older populations be related to changes in cognition and demonstrate the impact of declining cognition? Given the difficulties outlined by our sample of young-old adults, further qualitative research is necessary to develop a better understanding of the orientation and navigation experiences of older adults with and without memory difficulties, including comparative studies to examine experiences of older-old adults. In particular, we need to understand this 'fear of being lost' in more detail, by exploring the impact it may have on independence and wellbeing, and what it means for ageing and dementia-friendly community agendas, design principles and policy objectives such as ageing in place (Lawton, 1990).

Need for psychosocial interventions to enhance confidence and navigation skills

For most participants, it was more common to draw on avoidance strategies (avoiding new/unfamiliar environments and handing over responsibility to others) to reduce cognitive burden and psychological stressors. This could be a self-fulfilling prophecy. Older adults with self-reported memory difficulties recognised that navigation is more difficult and intimidating now; as a result, they became more concerned about their wellbeing and started to engage less and less on their own, which could then result in them feeling they had lost these skills. Conversely, those who regularly practised navigating and orientating in unfamiliar environments reported that they were good at it.

Future psychosocial interventions therefore need to focus on developing the navigation skills and confidence of older adults with memory difficulties to engage with new environments, supporting people to develop their navigation skills and looking at enhancing their confidence in navigating to break them out of this self-fulfilling cycle. If people have the confidence to go out into new areas then these skills may improve. Creating communities that are more age-friendly and using buddying systems/walking groups might be a way to support a growth in confidence. Drawing on neuropsychological theory and evidence from laboratory-based experiments will enable the identification of navigation strategies most affected by cognitive ageing. Developing appropriate interventions around these may be a

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useful first step in supporting older adults with self-reported memory difficulties to retain navigation skills for as long as possible.

When participants did engage in active navigation strategies (preparatory and in the moment), they drew from a range of them with varying success. Some participants were happy to use technology in the planning phase, yet less so during the actual journey. It was evident that technology had a role to play in this, yet participants described that it took up a lot of cognitive resources to listen to satnavs while also navigating the environment in a car. This highlights that any technical solutions need to be mindful of these challenges. Technology offers potential to support people's confidence to engage independently with new environments without getting lost or distressed, but there are difficulties with its uptake and efficacy for older adults that need to be addressed. Improving the accessibility and design of technology by involving older adults in the design process is recommended to ensure effective implementation of such technology in the future. Similarly, there is a need for older adults to increase their confidence to use technology whilst avigating outdoor environments.

Navigation strategies refute or embed the notion of a 'shrinking world'

Our findings contribute to discussions on the notion of the 'shrinking world' in research with people with dementia, where declining memory, confusion, disorientation, reduced confidence and anxiety all contribute to reducing outdoor activity (Duggan *et al.*, 2008). In our study, young-old adults with self-reported memory difficulties were aware of changes to their cognition and to their navigation and wayfinding activities, and some were able to describe the strategies that they utilised to overcome the risk of disorientation. Particularly the avoidance strategies (avoiding new areas/environments and avoiding responsibilities for navigation and wayfinding) have the potential to shrink people's worlds substantially (Duggan *et al.*, 2008). It was evident that our participants had some awareness that their world is shrinking as it starts to happen, and that they had developed strategies to counter the 'shrinking world', including using technology (*i.e.* Google Maps) to plan trips in advance to overcome the 'fear of getting lost', and relying on family and friends when navigating. Yet despite these strategies, everyday activities were impacted by the time and effort needed for advance planning, making it less likely that people would do this daily. Also, relying on family and friends when taking trips means people are dependent on the timetables of others which will restrict everyday activities. Many of our participants recognised the potential for their world to shrink and fought against it, whilst some appeared to be more resigned to it. Psychosocial interventions targeted towards those who were more resigned to it are therefore recommended.

There are limitations to the concept of a 'shrinking world', particularly as it does not position people as active social agents in their own lives who make deliberate changes to enhance their lifestyle and connections with the environment. This includes choosing to withdraw from certain locations that are further away in favour of greater social connections more locally, or changing from driving to walking as a way to better connect with the environment. These limitations can consequently reinforce ideas of the apathy of people with dementia (Ward *et al.*, 2022).

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However, the 'shrinking world' concept can provide a useful marker in discussion about age-related changes to physical mobility and navigation.

Our findings therefore highlight that the 'shrinking world' is not just something that people with dementia experience, but that the process can start much earlier, even before diagnosis, and may be impacted by factors such as age, environment and previous life experiences. This includes cultural and societal norms that may be specific to individual cohorts, *e.g.* more older men being car drivers than women may have a negative impact on journeys undertaken by widowed women (Stanley, 1995; Burns, 1999; Department for Transport, 2019). We suggest that further research explores wider socio-economic factors that are likely to influence older adults' outdoor mobility and navigation experience. For example, those who are better off financially have access to different transport and social networks, meaning that they can afford to use taxis if they wish. This may mean that their world will not shrink as quickly, or they can counter the threat of this better than others. It is likely that there will be some inequalities in the way people deal with these experiences, which will impact on their wellbeing and independence.

Study strengths and limitations

The qualitative approach used in this exploratory study helps amplify the voice of young-old adults with self-reported memory difficulties from across the UK. To our knowledge, this is the first study to identify the challenges young-old adults with memory difficulties face when orienting and navigating outdoor environments, and the resulting strategies they develop to overcome them. This study contributes new perspectives to the growing evidence base of inter-disciplinary research focused on use and experiences of outdoor environments in later life. The findings contribute to the wider ageing in place (Lawton, 1990; Phillips *et al.*, 2013; Rogers *et al.*, 2020) and ageing and dementia-friendly community (Alzheimer's Disease International, 2017) agenda and debates. However, given the relatively small sample size, it is difficult to extrapolate our findings to other young-old adults with self-reported memory difficulties within the UK. We acknowledge that the recruitment approach of seeking participants within the (in)direct contacts of our team may have unintentionally limited the range of participants involved in our study based on their demographic characteristics. In this study we relied on participants' subjective opinions of how their wayfinding and orientation abilities changed over the last 15 years. We believe that longitudinal mixed-methods studies that objectively assess people's navigation and orientation abilities in controlled experiments, and then look at how changes in navigation abilities influence their subjective experiences in the real world and the strategies they adopt, are required. Future studies should also explore whether the urban/rural nature of participants' surroundings shapes their experiences of outdoor environments. Some of our interviews were relatively short for a qualitative study. We used the same semi-structured format of questions for each interview. In the shorter interviews participants merely had less to say about their experiences. Finally, while this exploratory study highlights some of the experiences and perceived impacts of declining navigation abilities on people's everyday lives and wellbeing, we do not currently know how deteriorating navigational skills interact with other factors

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that could affect mobility and independence in older age, such as unease with exposing oneself to unfamiliar situations or novel social situations. This should be explored in future research.

Conclusion

Focusing qualitatively on the experiences of age-related declining navigation abilities and the impact on use of outdoor environments of young-old adults with subjective memory difficulties has revealed new insights. Understanding older adults' lived experience of outdoor mobility and navigation reveals the complexity of the interrelationship between cognitive and physical impacts of ageing, the environmental context and previous life experience, and how this leads to engagement or disengagement in outdoor environments. Whilst the heterogeneity of the ageing process disregards a one-size-fits-all model, there are clear similarities in experiences that can be drawn to shape future policy and practice for this group. Our findings demonstrate that whilst participants tended to engage with their community in the same way as before in terms of selecting transport and going about their familiar activities, declining cognitive function appeared to have a negative impact on their ability and confidence to navigate unfamiliar outdoor environments. Drawing on neuropsychological theory to identify navigation strategies most affected by ageing, we argue that future interventions should focus on developing confidence to engage in new environments to ensure that young-old adults with self-reported memory difficulties practise and retain these skills for as long as possible. In this context it is important to consider accessible technology that supports outdoor navigation and is not to burdensome for the user. Our findings contribute to the wider ageing-in-place and age-friendly communities agendas and a growing evidence base that recommends the development of age-friendly environments that can compensate for declining navigation and orientation abilities.

Ethical standards. Ethical approval was obtained from Bournemouth University Research Ethics Committee prior to the start of data collection (No. 27536). Principles of informed consent, voluntary participation, the right to withdraw, confidentiality and anonymity were adhered to.

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