Journal of the International Neuropsychological Society (2023), **29**, 105–109

doi:10.1017/S1355617721001375

BRIEF COMMUNICATION

Was the COVID-19 Pandemic Associated with Gender Disparities in Authorship of Manuscripts Submitted to Clinical Neuropsychology Journals?

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(Received June 9, 2021; Final revision October 1, 2021; Accepted November 16, 2021; First Published Online December 9, 2021)

Abstract

Objective: The COVID-19 pandemic exacerbated gender disparities in some academic disciplines. This study examined the association of the pandemic with gender authorship disparities in clinical neuropsychology (CN) journals. **Method:** Author bylines of 1,018 initial manuscript submissions to four major CN journals from March 15 through September 15 of both 2019 and 2020 were coded for binary gender. Additionally, authorship of 40 articles published on pandemic-related topics (COVID-19, teleneuropsychology) across nine CN journals were coded for binary gender. **Results:** Initial submissions to these four CN journals increased during the pandemic (+27.2%), with comparable increases in total number of authors coded as either women (+23.0%) or men (+25.4%). Neither the average percentage of women on manuscript bylines nor the proportion of women who were lead and/or corresponding authors differed significantly across time. Moreover, the representation of women as authors of pandemic-related articles did not differ from expected frequencies in the field. **Conclusions:** Findings suggest that representation of women as authors of peer-reviewed manuscript submissions to some CN journals did not change during the initial months of the COVID-19 pandemic. Future studies might examine how risk and protective factors may have influenced individual differences in scientific productivity during the pandemic.

Keywords: SARS-CoV-2, Bibliometrics, Female, Male, Publications, Peer review

INTRODUCTION

The COVID-19 pandemic may have exacerbated gender gaps in academia. Emerging data suggest that women[1] have had disproportionate reductions in research time and productivity coupled with increased time spent on childcare and housework (Deryugina, Shurchkov, & Stearns, 2021). Studies of scientific authorship during COVID-19 show that – despite higher overall rates of production during the early months of the COVID-19 pandemic (Cui, Ding, & Zhu, in press) – the relative proportion of manuscript submissions (Cui et al., in press) and publications (Muric, Lerman, & Ferrara, 2021) was lower for women than for men. These gender disparities are also evident in articles about COVID-19, on which women represent only one-third of authors (Lerchenmüller, et al., 2021). The underrepresentation of women during this critical period could have long-standing negative effects on academic advancement in promotion systems based heavily on publications (Wren, et al., 2007).

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[1]This paper uses a framework of "gender" (viz., men and women) rather than "sex" (i.e., male and female) because our aims are focused on the cultural aspects of research engagement and not on biological differences *per se*. In doing so, we acknowledge that gender is not a binary construct and that many of the foundational studies and methods in this area are limited by their binary approach to gender classification.

We do not know the extent to which the pandemic has affected the research productivity of women in clinical neuropsychology (CN), who represent 60% of the field (Sweet, Klipfel, Nelson, & Moberg, 2021). CN has a history of gender disparities in multiple domains, including scientific publishing (Rohling et al., in press). A recent study of 10,531 articles published between 1985 and 2019 in six CN journals revealed that women were underrepresented as authors in the 2000s, despite their growing prevalence in the field; for example, 43.3% of the authors listed in CN article bylines were women (Matchanova et al., in press), yet women comprised approximately 52% of clinical neuropsychologists during this period (Sweet, Lee, Guidotti Breting, & Benson, 2018). The present study extends this work by examining whether the COVID-19 pandemic affected the representation of women as authors on initial submissions to four representative CN journals. In addition, we report the representation of women on articles about the pandemic (e.g., COVID-19, teleneuropsychology) published in all major CN journals. The latter analysis provides insights on the extent to which women were productive in novel, emergent research projects during the pandemic and expands upon the limited representation of journals in the primary study by including all major journals in the field.

METHOD

Study 1: Initial Submissions to CN Journals

Invitations to participate in this study were sent by SPW and KOY to the editors of nine major journals in CN (Sweet, Meyer, Nelson, & Moberg, 2011) via electronic mail in April 2020. The editors of Archives of Clinical Neuropsychology (ACN), Journal of Clinical and Experimental Neuropsychology (JCEN), Neuropsychology (NP), and The Clinical Neuropsychologist (TCN) all agreed to participate by confirming their ability to secure the relevant permissions and data from their respective journal publishers. The remaining editors declined to participate, primarily due to limited resources or difficulties securing the relevant data and/or permissions. The institutional review board (IRB) at Wayne State University approved the coding and analysis of the data from *JCEN*, whereas IRBs at the University of Houston and University of Utah both independently determined that this retrospective, de-identified study was exempt. All aspects of the study were conducted in accordance with the Declaration of Helsinki.

Representatives from the four journals coded the probable gender[2] of each author on every consecutive initial submission received from March 15 through September 15 in the years 2019 and 2020. Each author was coded as either a man or woman for submissions to *ACN*, *JCEN*, and *TCN* based on the OpenGenderTracking Project database (Ros, Matias, & Hyland, 2013), which contains binary gender probabilities for over 90,000 first names that are derived from census data in the USA and UK. Where possible, authors whose names were not listed in the database or who were gender atypical were coded by verifying their gender on an institutional or personal website. This method has excellent interrater reliability (Matchanova et al., in press; Odic & Wojcik, 2020). The gender coding for Neuropsychology was conducted by the publisher as part of a broader project that used https://genderize.io/, which provides reliable estimates of authors' binary gender from their first name based on over 100 million data points collected from social media across over 200 countries.

The author byline coding from 1,070 records were sent in a deidentified file to the corresponding author (SPW). Fifty-two records were excluded because the lead or corresponding author names were not codable, which included submissions from Asia (65.4%), Europe/UK (17.4%), USA (7.7%), Central/South America (5.7%), Middle East (1.9%), and Canada (1.9%). The remaining 1,018 records were from primarily from author groups in the Europe/UK (31%) and U.S. (39%). The following variables were generated from the eligible records: (1) a continuous variable representing the number of women on the author byline (*range* = 0–27); (2) a continuous variable representing the percentage of women on the author byline (adjusted for any un-codable authors; *range* = 0–100%); (3) a binary variable indicating whether the lead author was a woman or a man; and (4) a binary variable indicating whether the corresponding author was a woman or a man.

Study 2: Pandemic-Related Articles Published in CN Journals

We identified all articles that were published in nine major neuropsychology journals between March 2020 and March 2021. Specifically, two authors reviewed the table of contents and advanced access sections of the four journals from Study 1, plus *Applied Neuropsychology-Adult, Child Neuropsychology, Journal of the International Neuropsychological Society, Journal of Neuropsychology, and Neuropsychology Review*. We selected papers that were related to the pandemic (e.g., COVID-19, teleneuropsychology) based on the contents in the title and abstract. We then used the methods described above for the OpenGenderTracking Project database to code the gender of all authors of every study in this sample. There were zero uncodable authors.

RESULTS

Study 1: Initial Submissions to CN Journals

Initial manuscript submissions to CN journals rose by 27%, from 448 submissions in 2019 to 570 submissions in 2020, (Pocock's $z = 3.9$, $p < .001$; Pocock, 2006). The total

[2]Note that individuals with a nonbinary gender identity are not represented in either database used in this study (for more information about nonbinary gender identities, please visit https://www.apadivisions.org/division-44/resources/advocacy/non-binary-facts.pdf), and it is possible that the binary gender coding used in this study may not align with the gender identities of some authors.

https://doi.org/10.1017/S1355617721001375 Published online by Cambridge University Press

submissions in 2019 and 2020 did not vary significantly by journal [X^2 (3, $n = 1018$) = 1.90, $p = .595$].

Results showed that 2,912 of the 5,304 authors across all articles ($n = 1,018$) were women (54.9%). The total number of authors who were women rose from 1,306 in 2019 to 1,606 in 2020, which is a significant increase of 23.0% (Pocock's $z = 5.6$, $p < .001$). The total number of authors who were men rose from 1,061 in 2019 to 1,331 in 2020, which is also a significant increase of 25.4% (Pocock's $z = 5.5$, $p < .001$). The increase in women authors from 2019 to 2020 did not differ from the increase in men authors during this timeframe (Pocock's $z = 0.34$, $p = .37$).

Next, we conducted a multiple regression predicting the percentage of authors who were women on any given submission byline across all articles ($n = 1,018$). The dummy-coded categorical predictors were: (a) year (2019 or 2020); (b) journal; and (c) the interaction of year and journal (see Figure 1). The overall model was not significant [F (7, 1010) = 1.74, $p = .095$] and explained a very small amount of the variance (adjusted $R^2 = .01$). No main effects or interactions in this model were significant (all ps > .05).

We then conducted a logistic regression predicting the likelihood of women as lead authors, again using year, journal, and their interaction as predictors (see Figure 2a). The overall model was not significant [X^2 (7, 1010) = 5.40, $p = .617$], nor were any of the individual predictors in the model significant (ps > .05, odds ratios < 1.3). Figure 2b shows similar null findings in a parallel logistic regression conducted with corresponding author as the criterion [X^2 (7, 236) = 12.00, $p = .102$]. Although this analysis was conducted conservatively on the 244 records for which a different person was lead and corresponding author, the overall model also was not significant when the analysis was conducted in the full sample [X^2 (7, 1010) = 8.3, $p = .310$].

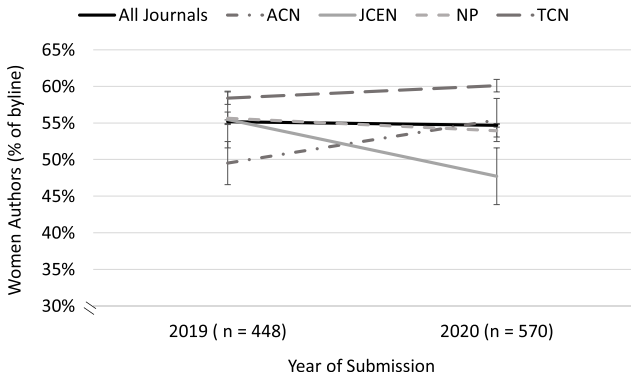

Fig. 1. Percentage of woman as authors in the bylines of initial manuscript submissions to clinical neuropsychology journals during the period of March through September 2019 and 2020. *ACN = Archives of Clinical Neuropsychology*; *JCEN = Journal of Clinical and Experimental Neuropsychology; NP = Neuropsychology*; and *TCN = The Clinical Neuropsychologist*. The double line symbol denotes a break in the Y-axis. Error bars reflect standard error. *Note*. Includes full sample ($n = 1,018$).

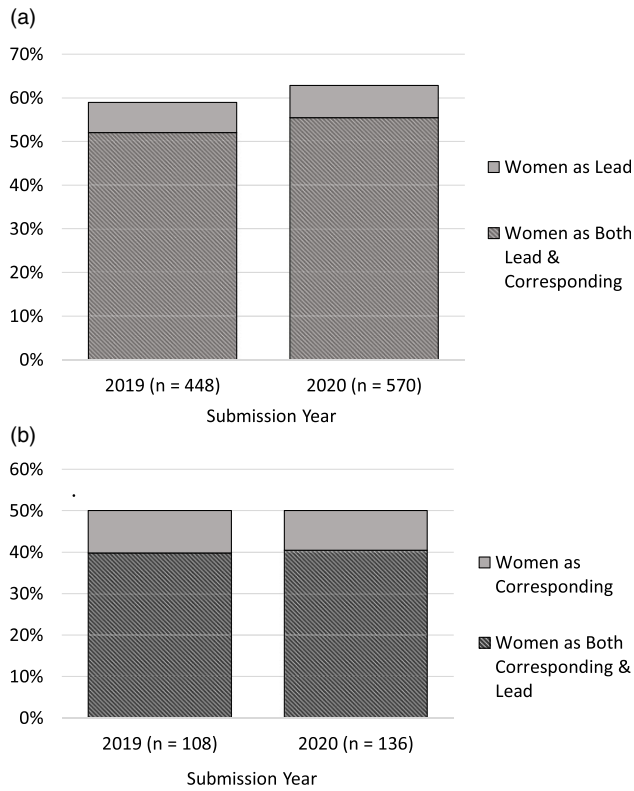

Fig. 2. Stacked column chart showing the frequency of women as lead (a) and corresponding (b) authors in the bylines of initial manuscript submissions to clinical neuropsychology journals during the period of March through September 2019 and 2020. *Note*. Excludes cases in which the same individual was both lead and corresponding author ($n = 244$).

Study 1 post hoc analyses

Epochs. Given the evolving nature of COVID-19, we also conducted a post hoc analysis to check for differences between the early (March 15–June 15) versus later (June 16–September 15) part of 2020. We repeated the multiple and logistic regression analyses described above and added main effects and interaction terms for a binary epoch variable that was dummy coded for early (0) versus late (1). No main effects or interactions for epoch emerged as significant predictors of the percentage of women on the byline or the likelihood of submissions with women as first or corresponding authors (all ps > .05)

Sponsorship. We also conducted post hoc analyses to examine the role of sponsorship in manuscript submissions, given its importance for authorship among women in CN (Matchanova et al., in press). Specifically, we conducted a series of one-way ANOVAs on the 570 initial submissions from 2020, with the continuous percentage of women authors as the dependent variable and the presence of a woman as either lead or corresponding author (binary yes/no) as independent variables. Results showed a higher percentage of women on author bylines when women were lead [70.0%

https://doi.org/10.1017/S1355617721001375 Published online by Cambridge University Press

vs. 32.9%; F (1, 568) = 302.32, $p < .001$, $d = 1.59$] or corresponding authors [71.2% vs. 37.8%; F (1, 568) = 269.94, $p < .001$, $d = 1.52$]. Similarly, among the 136 manuscripts submitted in 2020 in which the first and corresponding author were not the same person, the first author was 2.3 times more likely to be a woman when the corresponding author was also a woman, X^2 (1, $n = 136$) = 4.55; CI 95% 1.05, 5.05).

Study 2: Pandemic-Related Articles Published in CN Journals

Forty papers were identified across five journals, with author groups primarily located in North America. In total, 161 of the 237 authors of pandemic-related articles published in CN journals were women (67.9%). The following series of one-sample tests was anchored by the estimated 60% prevalence of women in CN (Sweet et al., 2021). On average, 64.4% ($SD = 29.90$, range = 0.0–100) of the authors on the bylines of the 40 articles were women, which did not differ statistically from the estimated prevalence of women in the field (one-sample $t = 0.93$, df = 39, $p = .357$, Cohen's $d = 0.13$). Likewise, 67.5% and 65.0% of the lead and corresponding authors were women, respectively, which did not differ significantly from the estimated prevalence of women in the field (one-sample X^2s < 1.0, ps > .05).

DISCUSSION

Emerging research suggests that women in academia were disproportionately affected during the early part of the COVID-19 pandemic in both home and professional activities, including publishing (Deryugina et al., 2021; Krukowski et al., 2021). Encouragingly, the present findings show no evidence of gender disparities in authorship or author byline position in manuscripts submitted to four major neuropsychology journals. In fact, submissions authored by men and women both increased during the pandemic. Similarly, women were well represented among 40 COVID-19 related publications in nine major CN journals. Thus, our findings suggest that women in CN were not underrepresented in research activity as indexed by journal submissions and publications, despite the notable stressors and challenges that accompanied the COVID-19 pandemic. Representation of women as authors in manuscript submissions during the early stages of the COVID-19 pandemic was largely comparable to that of women as authors in published manuscripts both within the larger field of psychology (see Odic & Wojcik, 2020) and within the subspecialty of CN (Matchanova et al., in press) over the past few years.

We considered several possible explanations for these encouraging findings. First, the research productivity of women clinical neuropsychologists may have kept pace with pre-COVID-19 research productivity levels because of the surge of young women in the field over the past two decades (Hilsabeck & Martin, 2010; Sweet et al., 2018). Younger professionals might have experienced a reduction in clinical and teaching responsibilities due to halted in-person services and might also have been less affected by increased childcare and household responsibilities as compared to mid-career women. In fact, an exploratory search revealed that among the 40 articles related to COVID-19 in CN journals, 77.7% of women as first authors were trainees or early-career scientists, as determined by their institution or personal website. Second, the sponsorship and mentorship provided to these early-career women by mid- and late-career women clinical neuropsychologists may have been protective during this tumultuous period (de Vries et al., 2006). Third, compared to other fields, psychologists may be better suited to acknowledge existing biases in the professional field and challenge them (APA, 2017). Relatedly, clinical neuropsychologists benefit from training in clinical psychology, including learning effective coping strategies, which in turn may have built added resilience to the stress of COVID-19. Interested readers are referred to a recent series of publications in *The Clinical Neuropsychologist* (Hilsabeck & Rivera Mindt, 2020) for recommendations on ways we can act as individuals and as a discipline to bolster women in the field of CN.

The current study is not without its limitations. Gender coding systems were binary and based on estimated probabilities from national databases that may have resulted in gender assigned to authors that does not match their identity. The lead or corresponding authors were uncodable for 4.5% of the articles, which were therefore excluded from analyses. This rate of exclusion is slightly lower than reported in prior studies using similar coding methods (Matchanova et al., in press; Odic & Wojcik, 2020), with Asia being the geographic region of origin for most of these articles. A minority of authors were from regions other than Europe/UK and North America. Only four of nine CN journals participated in Study 1; however, all nine journals were included in Study 2 and its similar results help to bolster the representativeness and robustness of the findings. Lastly, information about the race and ethnicity of the authors was not available, and we therefore were unable to comment on the potential intersectional impact of gender and race/ethnicity on research productivity during early stages of the COVID-19 pandemic. Given the underrepresentation of people who identify as Black and Latinx in CN (Sweet et al., 2021), prospective studies are needed to identify specific risk and resilience factors related to scientific productivity and academic advancement in individuals from these ethnoracial backgrounds.

ACKNOWLEDGEMENTS

The authors thank all of the women who have served as our mentors, sponsors, and collaborators over the years and in years to come. The authors also thank Steph Pollock and Lois Jones at the American Psychological Association for their efforts in securing and coding the data for *Neuropsychology*.

FINANCIAL SUPPORT

There were no funding sources for this project.

CONFLICTS OF INTEREST

Several authors serve major editorial roles for the journals that were included in this study. Dr. Lee is the Editor-in-Chief of *Archives of Clinical Neuropsychology* and is on the editorial board of *Neuropsychology Review*. Dr. Rapport is the co-Editor-in-Chief for *Journal of Clinical and Experimental Neuropsychology* and is on the editorial board of *The Clinical Neuropsychologist*. Dr. Suchy is the Editor-in-Chief for *The Clinical Neuropsychologist* and is on the editorial board of *Journal of the International Neuropsychological Society* and *Neuropsychology Review*. Dr. Yeates is Editor-in-Chief for *Neuropsychology* and is on the editorial board of *Archives of Clinical Neuropsychology, Child Neuropsychology, and Journal of Head Trauma Rehabilitation*. Dr. Woods is an Associate Editor for both *The Clinical Neuropsychologist* and *Neuropsychology* and is on the editorial boards of *Archives of Clinical Neuropsychology*, *Journal of Clinical and Experimental Neuropsychology,* and *Neuropsychology Review*. The other authors report no other conflicts of interest.

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