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The impact of COVID-19 on womxn in science and osteopathic medicine

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The novel coronavirus 2019 (COVID-19) pandemic has created serious health, social, economic, environmental, and political problems worldwide. It is beyond the scope of this Editorial to adequately address each problem in the space and time allotted, but all of those consequences certainly warrant further attention and investigation in the scientific literature; we encourage research submissions in those areas, particularly those assessing the long term behavioral health implications of the pandemic. For the purposes of this particular Editorial, though, I would like to address one specific issue of concern to the *Journal of Osteopathic Medicine* readership: the asymmetrically significant impact of COVID-19 on womxn – in particular, womxn researchers and osteopathic physicians with young children – in science and medicine. Of note, I have elected to utilize the intersectional and inclusive term “womxn,” added to the Oxford English Dictionary in 2019 [1], in recognition that gender is not a binary construct. While there continues to be some conversation and controversy around the term [2], I have selected it for this Editorial to honor the diverse experiences of all who identify as women and mothers.

Following the rapid worldwide spread of COVID-19 in early 2020, containment efforts and restrictions resulted in school closures [3], limited childcare options [4, 5], contributed to wage and revenue losses [6], and brought about vast restructuring of the workplace environment in many sectors [7]. For womxn researchers and osteopathic physicians with young children, these changes undoubtedly increased home and work related responsibilities [8, 9]. The impact of additional time spent on childcare and virtual school [8, 9] resulted in declining research productivity – but only for womxn [10–13]. Myers et al. [10] reported that womxn in science with at least one child 5 years of age or younger experienced a 17% decrease in time devoted to research, and womxn in the bench sciences reported

decreases ranging from 30–40% compared with pre-pandemic levels. Vincent-Lamarre et al. [12] observed a 44% drop in manuscript submissions by womxn on the preprint server medRxiv for health sciences research from December 2019 to April 2020. Similarly, Muric et al. [11] documented a 9.5% decrease in the proportion of womxn authors publishing in biomedical fields from January 2019 to August 2020, whereas Squazzoni et al. [14] found an increase in the number of manuscript submissions by men from February 2020 to May 2020, with men submitting twice the number of manuscripts to health and medicine journals compared with womxn. Muric et al. [11] also noted a 28% discrepancy in the proportion of published COVID-19 research articles with womxn as the first author vs. men and an 18.8% discrepancy in senior authorship by womxn vs. men. This disparity in COVID-19 research is a real time indicator of the pandemic’s unequal effects on womxn researchers, suggesting that womxn have less time, resources, and access to undertake and complete new research projects.

The consequences of these gender inequities are serious. In the short term, womxn will publish less, submit fewer grant applications, and receive less grant funding. Over the long term, their research and ultimately their careers may be at risk. Already, womxn – in particular women who are Black, indigenous, and people of color (BIPOC) – were underrepresented in academia [15]. Pre-pandemic, fewer than one in 10 womxn faculty were ranked as full professors [16], with womxn and BIPOC more likely to hold adjunct and nontenure track positions. Womxn were less likely to submit grant applications, oversee multiple grants, and hold as many funding grants as men [17, 18]. Further, womxn represented only 29.0% of journal editorial boards members [19]. In specific disciplines, womxn’s h-index scores were significantly lower than those of their male colleagues despite academic rank [20], and womxn and BIPOC were tasked with more service related activities than their male colleagues [21].

The pandemic’s financial toll has led to the elimination of hundreds of thousands of positions at institutions of higher education, including thousands of adjunct and nontenure track professors, many likely to be womxn and BIPOC [22]. Many womxn holding tenure track positions

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have been forced to pause their tenure “clocks,” which in turn will decrease their lifetime earning potential [23], further widening the gender pay gap in academic medicine [24]. In summary, the pandemic has jeopardized the hard fought gender gains achieved in research over the last 50 years [25].

Finally, and perhaps most grim, is the potential loss of scientific discovery in medicine. Decreased productivity and fewer positions for womxn in academic medicine will result in less accurate and less diverse research. Womxn understand the importance of gender expression in medicine and contribute novel ideas and perspectives to scientific inquiry. Without womxn’s contributions to science, we would not have messenger ribonucleic acid technology (Dr. Katalin Karikó [26]) used to develop the Moderna (Dr. Kizzmekia Corbett [27]), Pfizer (Dr. Kathrin Jansen [28]), and Johnson & Johnson vaccines, nor clinical trial data (Dr. Lisa Jackson [29]) that is guiding our vaccination plans (Dr. Rochelle Walensky [30]). Our society needs womxn in science and medicine to lead cutting edge research and innovation. Moreover, thousands of womxn osteopathic physicians have been working on the front lines of the COVID-19 response to care for our families, friends, and neighbors. The physical and emotional toll of this work deserves to be addressed. Prepandemic, womxn physicians and physicians in training reported a higher incidence of burnout, specifically emotional exhaustion and depersonalization, compared to their male counterparts [31, 32]. New research from the Healthcare Worker Exposure Response & Outcomes Registry collected between April 2020 and July 2020 showed that the odds of reporting job burnout were 55% higher among womxn physicians than men physicians [19]. The added stress of the pandemic combined with longer workdays and increased domestic responsibilities likely contributed to the observed gender disparity in burnout [33]. To support our womxn physicians, the osteopathic community will need to come together to develop a multifaceted approach to care for womxn physicians’ physical, mental, and spiritual health.

Importantly, I acknowledge that the COVID-19 pandemic has negatively impacted people of all ages, genders, races, ethnicities, sexual orientations, social classes, and abilities. This Editorial was not written to suggest that womxn researchers and osteopathic physicians with young children have endured more suffering than any other group, nor to diminish the work of their partners and other caregivers. I wrote this Editorial because I identify as a member of this group and can speak to the challenges of balancing academic research while parenting from home with a young child. In closing, perhaps we can learn to recognize further and appreciate the toll this pandemic has

taken on all of us, understanding that we grieve as a collective group.

But we must remember to leave the seats at the table for womxn.

To learn more about strategies to support womxn in research and medicine, I encourage each of you to read a recent article by Fulweiler et al. in *PLoS Biology* [34].

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References

1. Spector N. ‘Male gaze’, ‘imposter syndrome’ and ‘womxn’ among Dictionary.com’s new words of 2019. Available from: <https://www.nbcnews.com/better/lifestyle/male-gaze-imposter-syndrome-womxn-among-dictionary-com-s-new-ncna991421> [Accessed 5 Apr 2021].
2. British Broadcasting Corporation. Twitch backtracks after outcry for using ‘gender neutral’ term ‘womxn’. Available from: <https://www.bbc.com/news/technology-56251452> [Accessed 5 Apr 2021].
3. United Nations Children’s Fund. COVID-19 and school closures. Available from: <https://data.unicef.org/resources/one-year-of-covid-19-and-school-closures/> [Accessed 5 Apr 2021].
4. Gromada A, Richardson D, Rees G. Childcare in a global crisis: the impact of COVID-19 on work and family life. Available from: <https://www.unicef-irc.org/publications/1109-childcare-in-a-global-crisis-the-impact-of-covid-19-on-work-and-family-life.html> [Accessed 5 Apr 2021].
5. Zero to Three Policy Center. How COVID-19 is impacting child care providers. Available from: <https://www.zerotothree.org/resources/3398-how-covid-19-is-impacting-child-care-providers> [Accessed 5 Apr 2021].
6. Parker K, Minkin R, Bennet J. Economic fallout from COVID-19 continues to hit lower-income Americans the hardest; 2020. Available from: <https://www.pewresearch.org/social-trends/2020/09/24/economic-fallout-from-covid-19-continues-to-hit-lower-income-americans-the-hardest/>.
7. British Broadcasting Corporation. Worklife: unknown questions. Coronavirus: how the world of work may change forever. Available from: <https://www.bbc.com/worklife/article/20201023-coronavirus-how-will-the-pandemic-change-the-way-we-work> [Accessed 5 Apr 2021].
8. Carlson DL, Petts R, Pepin JR. Changes in parents’ domestic labor during the COVID-19 pandemic. *SocArXiv* 2020;1–41. <https://doi.org/10.31235/osf.io/jy8fn>.

9. Pearson C, Levine M, Messman A, Chopra T, Awali R, Robb L, et al. Understanding the impact of COVID-19 on physician moms. *Disaster Med Public Health Prep* 2021;1–17. <https://doi.org/10.1017/dmp.2021.49>.
10. Myers KR, Tham WY, Yin Y, Cohodes N, Thursby JG, Thursby MC, et al. Unequal effects of the COVID-19 pandemic on scientists. *Nat Hum Behav* 2020;4:880–3.
11. Muric G, Lerman K, Ferrara E. Gender disparity in the authorship of biomedical research publications during the COVID-19 pandemic. *J Med Internet Res* 2021;23:e25379.
12. Vincent-Lamarre P, Sugimoto CR, Lariviere V. The decline of women's research production during the coronavirus pandemic. Available from: <https://www.natureindex.com/news-blog/decline-women-scientist-research-publishing-production-coronavirus-pandemic> [Accessed 30 Mar 2021].
13. Ipe TS, Goel R, Howes L, Bakhtary S. The impact of COVID-19 on academic productivity by female physicians and researchers in transfusion medicine. *Transfusion* 2021;1–4. <https://doi.org/10.1111/trf.16306>.
14. Squazzoni F, Bravo G, Grimaold F, Garcia-Costa D, Farjam M, Mehmani B. Only second-class tickets for women in the COVID-19 race. A study on manuscript submissions and reviews in 2329 Elsevier journals. *SSRN* 2020;1–28.
15. Dobbs CL, Montecillo Leider C. The perils of notional membership during a pandemic. *J Prof Cap Community* 2020;5:273–80.
16. Finkelstein MJ, Conley VM, Schuster JH. Taking the measure of faculty diversity. *Adv High Educ* 2016;1–18.
17. Hechtman LA, Moore NP, Schulkey CE, Miklos AC, Calcagno AM, Aragon R, et al. NIH funding longevity by gender. *Proc Natl Acad Sci U S A* 2018;115:7943–8.
18. Rissle RL, Hale KL, Joffe NR, Caruso NM. Gender differences in grant submissions across science and engineering fields at the NSF. *Bioscience* 2020;70:814–20.
19. Forrest CB, Xu H, Thomas LE, Webb LE, Cohen LW, Carey TS, et al. Impact of the early phase of the COVID-19 pandemic on US healthcare workers: results from the HERO registry. *J Gen Intern Med* 2021;1–8. <https://doi.org/10.1007/s11606-020-06529-z>.
20. Radford DM, Parangi S, Tu C, Silver JK. h-index and academic rank by gender among breast surgery fellowship faculty. *J Wom Health (Larchmt)* 2021;1–7. <https://doi.org/10.1089/jwh.2020.8579>.
21. Armijo PR, Silver JK, Larson AR, Asante P, Shillcutt S. Citizenship tasks and women physicians: additional woman tax in academic medicine? *J Wom Health (Larchmt)* 2020;1–9. <https://doi.org/10.1089/jwh.2020.8482>.
22. Bauman D. A brutal tally: higher ed lost 650,000 jobs last year. Available from: https://www.chronicle.com/article/a-brutal-tally-higher-ed-lost-650-000-jobs-last-year?cid=gen_sign_in [Accessed 31 Mar 2021].
23. Manchester CF, Leslie LM, Kramer A. Is the clock still ticking? An evaluation of the consequences of stopping the tenure clock. *Ind Labor Relat Rev* 2013;66:3–31.
24. Bates C, Gordon L, Travis E, Chatterjee A, Chaudron L, Fivush B, et al. Striving for gender equity in academic medicine careers: a call to action. *Acad Med* 2016;91:1050–2.
25. Kashen J, Glynn SJ, Novello A. How COVID-19 sent women's workforce progress backward. Available from: <https://www.americanprogress.org/issues/women/reports/2020/10/30/492582/covid-19-sent-womens-workforce-progress-backward/> [Accessed 5 Apr 2021].
26. Asmelash L, Willingham AJ. She was demoted, doubted and rejected. Now, her work is the basis of the Covid-19 vaccine. Available from: <https://www.cnn.com/2020/12/16/us/katalin-kariko-covid-19-vaccine-scientist-trnd/index.html> [Accessed 5 Apr 2021].
27. Romero L, Salzman S, Folmer K. Kizzmekia Corbett, an African American woman, is praised as key scientist behind COVID-19 vaccine; 2020. Available from: <https://abcnews.go.com/Health/kizzmekia-corbett-african-american-woman-praised-key-scientist/story?id=74679965> [Accessed 5 Apr 2021].
28. Herper M, Jansen K. In the race for a Covid-19 vaccine, Pfizer turns to a scientist with a history of defying skeptics — and getting results. Available from: <https://www.statnews.com/2020/08/24/pfizer-edge-in-the-race-for-a-covid-19-vaccine-could-be-a-scientist-with-two-best-sellers-to-her-credit/> [Accessed 5 Apr 2021].
29. Schainbaum E. COVID-19 vaccine generates immune response, well tolerated. Available from: <https://about.kaiserpermanente.org/our-story/health-research/news/covid-19-vaccine-generates-immune-response-well-tolerated> [Accessed 5 Apr 2021].
30. Centers for Disease Control and Prevention. Media statement from Rochelle P. Walensky, MD, MPH, CDC Director and ATSDR administrator. Available from: <https://www.cdc.gov/media/releases/2021/s0120-rochelle-walensky.html> [Accessed 5 Apr 2021].
31. Del Carmen MG, Herman J, Rao S, Hidrue MK, Ting D, Lehrhoff SR, et al. Trends and factors associated with physician burnout at a multispecialty academic faculty practice organization. *JAMA Netw Open* 2019;2:e190554.
32. Dyrbye LN, West CP, Satele D, Boone S, Tan L, Sloan J, et al. Burnout among U.S. medical students, residents, and early career physicians relative to the general U.S. population. *Acad Med* 2014;89:443–51.
33. Uhlig-Reche H, Larson AR, Silver JK, Tenforde A, McQueen A, Verduzco-Gutierrez M. Investigation of work-life integration on burnout symptoms in women physician runners: a cross-sectional survey study. *BMJ Open Sport Exerc Med* 2021;7:e001028.
34. Fulweiler RW, Davies SW, Biddle JF, Burgin AJ, Cooperdock EHG, Hanley TC, et al. Rebuild the academy: supporting academic mothers during COVID-19 and beyond. *PLoS Biol* 2021;19:e3001100.