

Pre-Existing Social Conditions: A Call to Prevent the Perpetuation of Gender Inequalities in Research Production during COVID-19

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The coronavirus disease 2019 (COVID-19) global pandemic continues to influence a vast array of aspects in our material, psychological, and social lives. The area of academic publishing does not seem to be an exception. Emerging evidence reveals that there are changing patterns in scientific endeavors, including an exponential increase in the number of COVID-19 related manuscripts submitted to academic journals for peer review.¹ Among these documented changing patterns, of note are the gender discrepancies, with women producing significantly less research than men, including article submissions, pre-prints, and publications, since the initial COVID-19 outbreak in early 2020.²⁻⁵ For example, in one interesting and sophisticated statistical examination, Squazonni and colleagues¹ calculated the change in submissions during the initial quarantine period using the individual as the unit of analysis. They found that, while article submissions increased for everyone, they did so at a significantly higher rate among men. And, in three out of four different academic disciplines including *Health & Medicine*, there was an interaction effect between gender and seniority, with women in more advanced stages of their career being negatively impacted the most in terms of article submission rates. While these patterns have been noted across different disciplines, but to differing degrees,⁶ it is of particular interest here how gender inequality in research production may have long-lasting effects on the careers of current medical students.

The global pandemic has increased the demand for systematic studies on our changing society. Medical students are responding accordingly,⁷ however, this may have exacerbated existing gender inequalities. In contemplating what academic journals' responsibilities are, it is beneficial to consider the possible underlying societal causes of these gender inequalities. That is, gender inequalities in research production can be considered a natural and expected extension of larger societal patterns that existed long before the pandemic.⁸ In trying to disentangle the causes and effects of COVID-19 on gender inequality in academic publishing, it is useful to consider at least three intersecting and pre-existing social conditions, all of which research has identified in the field of medicine: 1) the unequal division of labor both at home and work; 2) women's lower well-being compared to men; and 3) men's greater representation in science, technology, engineering, and mathematics (STEM) fields.

The first consideration regarding the well-documented unequal division of domestic labor begs the question: For those who have been stuck at home, what exactly are they doing, and are these activities related to the differential rates of article submissions? Recent research suggests that, yes, women and men have not been spending their time in the same ways during the pandemic. For example, in an analysis of change in paid work hours, among those who were fortunate enough to continue employment during the original lockdown period, Collins and colleagues⁹ found that women, and in particular mothers of young children, had reduced their work hours significantly more so than men/fathers. These findings of a "motherhood penalty"¹⁰ are neither new nor surprising and suggest that the well-documented historical pattern of women's disproportionate contribution to home and childcare duties¹¹ has worsened with the pandemic, particularly regarding new homeschooling responsibilities.¹² In turn, women's greater domestic labor roles are likely a contributing factor to female medical students' lower rates of academic publishing during the pandemic.¹³

It is well established that women consistently report greater levels of psychological distress compared to men,¹⁴ which is the second gendered pattern that existed long before COVID-19, but nonetheless may have been magnified by the pandemic and, in turn, affected rates of academic publishing. The viral pandemic has provoked many anxieties and uncertainties, which may have a greater burden on women, therefore, making it difficult to conduct research. This may be especially true since isolation and loneliness from quarantining and physical distancing regulations are likely to produce a public health crisis unparalleled to anything we have seen before.¹⁵ Furthermore, we should expect medical students to be particularly susceptible to these adverse effects, since they are already at an increased risk of psychological distress arising from the demands of medical school, including professional burnout,^{16,17} depression and anxiety,¹⁸⁻²⁰ low life satisfaction,²¹ alcohol/substance misuse,²² suicidal ideation,²³ and suicide.²⁴ Early reports suggest that the well-being of medical students has suffered as a result of the pandemic and—again, not surprisingly—female medical students seem to be particularly vulnerable.²⁵⁻²⁷

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A third related possible explanation for men's greater productivity in academic publishing since the initial COVID-19 outbreak is their disproportionate representation in STEM fields, making men especially prime to conduct COVID-19 related research. Presently, women are significantly underrepresented in STEM globally.²⁸ Thus, more men may have been in a superior position to readily apply their research to be COVID-19 specific. There is some evidence to support this claim in which analyses on COVID-19 related studies show that men are indeed submitting and publishing more in this specific area than are women.^{1,5,29}

Unfortunately, lessened research productivity during medical school may have cumulative effects that disadvantage women's careers long-term. It is well understood that published research during medical school improves residency applications, thus, increasing chances of acceptance into highly competitive programs.³⁰⁻³³ This is confirmed by the results of the 2020 *National Residency Match Program*. For both MD and DO US students in most specialties, matched students had a higher number of research experiences and publications compared to unmatched students.^{34,35} Although there is heterogeneity in the application for specialty programs worldwide, a unifying trend seen internationally is the benefit of publishing research during one's own medical career.

Beyond increasing the quality of an individual's residency application, research conducted during medical school assists in identifying future physician-scientists. The career of a physician-scientist is unfortunately a declining population globally, with many medical education programs attempting to address this through compulsory research courses.³⁶⁻³⁸ Therefore, since the onset of this pandemic, the decline of published research by female medical students threatens women's careers.³⁹ As a society, we are at risk of reversing the diligent work achieved to improve gender equality in the fields of science and medicine and are

at a crucial point where promoting and providing opportunities for the development of women physician-scientists is necessary to avoid this risk.

The COVID-19 pandemic has dramatically increased the amount of academic publishing over the past year. Pre-pandemic, the research community expressed the importance and intentions to address its own gender disparities.⁴⁰⁻⁴² However, in a world of a viral pandemic and traditional social structures, STEM research has not successfully fulfilled its objectives. Female medical students, even those who excel in their academic pursuits, are at a significant disadvantage of publishing research and risk the glass ceiling effect once they graduate.⁴³ This may be due to COVID-19 exacerbating the unequal expectations of domestic duties for females, higher risk of psychological distress in women, and overall fewer scientific contributions by women in the field of science and medicine.

So, what are journals' responsibilities, especially a journal that is explicitly committed to highlighting medical students' experiences and advancing their careers by giving them an outlet for scientific publication? Although a single journal cannot completely reverse the profound societal gender inequalities that currently exist; an individual journal can provide attention to these discussed patterns, recognize their own short-comings, and actively work towards inclusion and equality throughout their scientific endeavors. While "pre-existing conditions"—the social, economic, political, and historical forces discussed above—have led us to the gender inequalities we experience today, *The International Journal of Medical Students* (IJMS) is committed to acknowledging these gender inequalities and preventing their perpetuation among the next generation of future doctors and physician-scientists.

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Acknowledgments

None.

Conflict of Interest Statement & Funding

The Authors have no funding, financial relationships or conflicts of interest to disclose.

Author Contributions

Conceptualization: KRM. Writing – Original Draft Preparation: KRM. Writing – Review & Editing: KRM, MJC, CE & LK.

Cite as

MacArthur KR, Cox MJ, Egan C, Komer L. Pre-Existing Social Conditions: A Call to Prevent the Perpetuation of Gender Inequalities in Research Production during COVID-19. *Int J Med Students*. 2020 Sep-Dec;8(3):217-9.

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ISSN 2076-6327

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