Academia During the Time of COVID-19: Examining the Voices of Untenured Female Professors in STEM

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Abstract
This paper highlighted the diverse voices of 84 female-identifying professors in STEM fields who responded to a series of open-ended questions regarding work, family, and tenure experiences in the context of the current global pandemic. The current paper is part of a longitudinal study of the vocational experiences of tenure-track women in STEM that has examined the “leaky pipeline” in women’s academic careers. Consensual Qualitative Research-Modified (CQR-M; ) was implemented to analyze the data. The findings suggested that participants perceived the precarious balance between work and family to have increased in difficulty in the face of COVID-19. Among untenured female faculty with children, an added layer of challenge was noted related to loss of childcare in the wake of the pandemic. The pre-existing, pervasive barriers (i.e., institutional, systemic, and psychological) were further exacerbated by familial barriers for female STEM faculty seeking tenure during COVID-19. Overall, the results indicated missed opportunities within higher education to implement supportive policies for untenured female faculty in STEM. Clinical implications, future research directions, and social advocacy interventions in the context of COVID-19 are discussed.

Keywords
COVID-19, STEM, work-family interface, consensual qualitative research-modified (CQR-M), female-identifying faculty, academia

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The Coronavirus-19 (COVID-19) global pandemic has illuminated sociocultural inequities across various sectors of the American workplace, including marked gender discrepancies among postsecondary faculty in STEM. The pandemic has amplified long-standing gender differences in academia (Gabster et al., 2020), preliminary evidence suggesting that female faculty are submitting and publishing fewer papers during the Coronavirus pandemic (Flahrety; Krukowski et al., 2021). One recent study revealed that the gap in work-related tweets tripled between female and male academics as participants worked from home (Kim & Patterson, 2020). Given that previous research has highlighted inequities in the work-family interface among female faculty in STEM (e.g., Kachchaf et al., 2015; McCutcheon & Morrison, 2018), the current paper sought to examine how female-identifying faculty are experiencing their academic work, the tenure journey, and personal life during the time of COVID-19.

**Female-Identifying Faculty in STEM**

Female-identifying faculty in STEM conduct basic and applied scientific research in fields directly or indirectly related to global health and well-being, including, but not limited to, biology, chemistry, pathophysiology, virology, mathematics, economics, and medicine. Female faculty represent only 28.2% of all tenured STEM faculty (National Science Foundation [NSF], 2019), despite earning 51% of all STEM doctoral degrees in the United States (National Science Board, 2018). Among female STEM faculty, Latina, Black, and Native American female tenured STEM professors are particularly underrepresented, constituting only 1.3%, 1.4%, and 0.04% of all tenured STEM faculty, respectively (NSF, 2019), which is notable as Latina, Black, and Native American women were estimated to make up 8.8%, 6.6%, and 0.4% of the total United States population, respectively, in 2018 (United States Census Bureau, 2018). The work-family interface, including work-family enrichment and conflict, provides one possible interpretation lens for understanding the underrepresentation of women in STEM.

**Work and Family Among Female Academics**

**Gender Inequality**

The vocational psychology and work-family interface literatures have described “dark clouds” and “silver linings” among women faculty and academic motherhood (e.g., Ward & Wolf-Wendel, 2004), gender and racial discrimination (Blackwell et al., 2009) with unique experiences among female faculty of color (e.g., Kachchaf et al., 2015). Specifically, the work-family interface literature has highlighted pathways of work-family conflict and enrichment (e.g., Gareis et al., 2009; Greenhaus & Powell, 2006) among female academics (e.g., Jijena-Michel & Jijena Michel, 2012) that may inform the experiences of untenured female STEM academics. Other challenges experienced by untenured female faculty in STEM were that of limited mentors and role models (Ysseldyk et al., 2019), who posited that having limited mentors/role models at the institutional and departmental level proved challenging due to the absence of guidance and professional support from individuals who have gone through the tenure process and could impart invaluable advice. Additionally, Casad et al. (2021) postulated the barriers of limited opportunities for tenure and hostile work environment. Though, when female faculty secure a tenure position, hostility from male counterparts often confounds the work environment. Gender discrimination experienced by untenured female STEM faculty, further exacerbated by the precarious balance between work and family, serve as a perennial hurdle among female faculty (Blackwell et al., 2009).

These complementary literatures describe the changing landscape of the work-family interface over the past few decades, as women are increasingly more likely to demonstrate similar
educational achievement as men and engage in multiple roles (e.g., worker, mother, and partner). Previously, Mason et al. (2013) described a “mom penalty” in academia in that having children reduces mothers’ likelihood of obtaining tenure. Among women in science, the researchers identified the largest leaks in the academic pipeline as occurring in the post-doc and early tenure process, with amplified gender disparities in science fields. Female-identifying faculty broadly reported work-family conflict and unsupportive workplace policies for women are especially pernicious career barriers. For instance, in a qualitative study of psychology women faculty and graduate students, McCutcheon & Morrison (2018) identified several interconnected themes, including masculine workplace norms (e.g., around productivity and family leave), difficult choices (e.g., leaving academia and delaying childbearing), and work-family conflict consequences (e.g., on social relationships and health). Toffoletti and Starr (2016) found that academic women in early and mid-career phases experience more tensions between work and family, yet women in academia with no children or adult children still describe their experiences in gendered terms by contextualizing their work in terms of their family responsibilities. Kachchaf and colleagues (2015) identified how women of color in academic STEM positions may have additional difficulties with career-family balance as they occupy identities that deviate from the ideal worker norm. While we acknowledge many barriers impact women’s career development, the literature also indicates specific support for female academics in STEM. For instance, Liu et al. (2019) suggested a range of social support structures like professional networks, and mentorship programs that may help plug the leaky pipeline for women faculty of color in STEM.

Impact of COVID-19 Pandemic

These conflicts and gendered processes are further exacerbated during times of crisis. During the COVID-19 pandemic, preliminary findings suggest that academic women in STEM fields and academic mothers that have not leaked from the pipeline have suffered enormously during the pandemic. According to one study using the U.S. Current Population Survey data, among dual-earning couples during the pandemic, mothers with young children experienced drastic shifts in employment, reducing their hours four to five times more than fathers (Collins et al., 2020). Notably, women have shouldered the majority of care at home during the pandemic (Heggenness & Fields, 2020). Marcal (2013) argued that such gender differences in employment and domestic work reflect an economic system that does not account for care-work in gross domestic product (GDP) in economic theory and practice. Anne Petersen (2020) from the New York Times described burnout as a norm for many American parents, exacerbated by inequality in gender role socialization:

The tacit agreement: Women could enter the workplace, but only if they fulfilled every other societal expectation. They could be ambitious, but still had to be nice; powerful, but still hot; hardworking, but still a good cook; multitasking, but still a conscientious housekeeper; a leader, but still feminine; a workaholic, but still a devoted parent. Men participate in and reinforce these ideals, but the primary arbitrators of success or failure are other women. (para. 4).

Theoretical Underpinnings in Career Development

While no career theory specifically addresses the unprecedented work context that has arisen during the COVID-19 pandemic and the far-reaching impact the pandemic has had on workers in the U.S., we chose to use the Psychology of Working Theory (PWT; Duffy et al., 2016) as a theoretical base for the current study because of its focus on economic constraints and marginalization on those seeking and maintaining decent work.
Specifically, PWT is oriented toward social justice and intersectionality and makes several propositions about the predictors and outcomes of decent work, defined as work that provides a safe environment; adequate time for rest outside of work; adequate compensation and health care; and alignment of organizational, family, and social values (Duffy et al., 2016). Moreover, PWT underscores social support as a moderator between marginalization and a range of work-related predictors including work volition, career adaptability, and decent work. Previous research has found that for untenured women STEM faculty, demands on time, difficulty attaining work-life balance, and experiences of sexism were perceived as barriers to obtaining tenure (Authors et al., 2020), thus not fulfilling several criteria of decent work. Literature has also documented the marginalization of women in STEM academia, including through gender discrimination (Xu, 2008) and exclusion in informal interactions (Maranto & Griffin, 2011).

Preliminary evidence on the impacts of the COVID-19 pandemic has suggested that pre-existing difficulties accessing decent work among tenure-track STEM women faculty may be exacerbated by the pandemic. For example, among faculty in the fields of ecology and evolutionary biology, participants were less satisfied with their work-life balance during the pandemic compared to before, with women, those with children under the age of 19, and assistant professors the most dissatisfied compared to their counterparts (Aubry et al., 2021). Autin et al. (2020) suggest that, although offering benefits in job security, working from home has “resulted in increasingly blurred boundaries between work and leisure time,” (p. 491) that may negatively impact work-life balance. In addition, the impact of the pandemic on women STEM faculty, and particularly women of color, may be even more significant due to the pre-existing experiences of marginalization and gender inequity (Woitowich et al., 2021).

According to PWT, decent work is expected to predict fulfillment of survival, social connection, and self-determination needs, which predict work-fulfillment and well-being (Duffy et al., 2016). Thus, to the extent that the work experiences of women STEM faculty do not meet criteria for decent work, which is expected to be more likely as a result of the COVID-19 pandemic, it is possible that tenure-track female identified faculty in STEM fields may experience decreased well-being and fulfillment through their work. Moreover, Autin et al. (2020) suggest that the isolation of working from home, in addition to uncertain job security, as a result of the COVID-19 pandemic places workers at increased risk of mental health concerns and impacts. Thus, PWT provides an explanatory mechanism for understanding the specific challenge of female-identifying STEM faculty. The current study sought to expand on PWT and understand how female-identifying faculty in STEM experienced support and coped with an unprecedented pandemic, in which work, family, and home collided.

The Current Study

Untenured female faculty in STEM may experience additional work and family pressures in the COVID-19 pandemic. Also, these tensions may be exacerbated among faculty with school-age children who were suddenly tasked with providing additional childcare and overseeing their children’s virtual education. As such, the current paper sought to explore two specific questions among female academics in STEM during the current pandemic. First, we examined useful vocational or other supports during the COVID-19 pandemic. Second, we investigated personal experiences related to the work-family interface that affect the tenure process, specifically by asking about work-family enrichment and work-family conflict, and how the COVID-19 pandemic has influenced participants’ pathways to tenure.
**Method**

**Participants**

The sample included 84 female-identifying women in academic STEM positions. Of the 181 participants who consented to annual follow-up as part of a larger longitudinal study, 109 participants completed the survey (response rate 60.2%). Twenty-five participants were removed due to either leaving academia or completing the tenure process. The participants had an average age of 34.7 (SD = 4.4), identifying as White, non-Hispanic (80%), Hispanic/Latino (11%), Asian/Asian American (5%), Biracial (2%), African American (1%), and other (1%). The majority were heterosexual (92%), married (70%), and had children (55%). Those in a committed relationship reported being extremely committed to their partner (96%), and of those with children, the majority reported having one (41%) or two (48%) children, with the majority of children being under the age of eight (52%). The participants represented a diverse range of STEM fields, with a majority indicating that they were in their first faculty job (87%), were employed in a public or private doctoral-level research institution (63%) with high research productivity levels (61%), working 40–60 hours a week (86%), and were located in the Midwest (79%). Specifically, the STEM fields represented by participants included biological and agricultural science (40%); engineering (25%); earth, atmospheric, and ocean sciences (12%); physical sciences (11%); mathematics and computer sciences (2%); and other (10%).

**Procedures**

This study was part of a larger longitudinal project which collected data yearly on a cohort of untenured STEM female faculty. The current online study included both a battery of self-report quantitative measures related to the larger longitudinal study and a set of open-ended questions that were used for qualitative analysis. The data was collected in the span of 3 weeks during April 2020, during the “peak” of the first wave of the COVID-19 pandemic in the U.S., when nearly all higher education institutions had instituted remote learning and teaching.

**Measures**

**Demographics**

Data on participants’ age, race/ethnicity, sexual orientation, relationship status, work status, commitment to romantic relationship, number and ages of children, and characteristics of their current employment (employment age, field, location, salary, hours, and research expectations) were collected.

**Open-Ended Questions**

Participants responded to three open-ended questions developed by the authors to better understand the pandemic’s impact on STEM untenured women’s tenure journey and work-family interface. They were presented with the following: 1) What supports have been useful, or would be useful, during this time (either through the university or from other sources) to cope with the effects of COVID-19? 2) How has your pathway to tenure been impacted by COVID-19? Feel free to comment on your work and personal/family life as they relate to your tenure journey during COVID-19. 3) How does your tenure journey enrich or cause conflict with your personal/family life? Alternatively, how does your personal/family life enrich or cause conflict with your tenure journey?
Data Analysis

Consistent with recommendations by Levitt et al. (2018), consideration of methodological integrity, specifically fidelity to the subject matter, was given when selecting the best research design for achieving our research goals. Given the exploratory and descriptive nature of the current study and the lack of pre-existing literature in this area, consensual qualitative research-modified (CQR-M; Spangler et al., 2012) was selected. CQR-M is a discovery-oriented research method, which allows for analysis of large samples with relatively brief qualitative data. CQR-M is particularly useful, as it allows for a wide range of viewpoints from participants in different contexts that could be collected in a short period of time, and the COVID-19 pandemic has had a rapidly evolving effect on higher education. Additionally, given the range of potential impacts that COVID-19 could have on faculty, the current study focused on targeted questions surrounding the experience of work/life balance for women during the pandemic. This methodology prioritized an understanding of the breadth of experiences rather than the depth characteristic of other qualitative methodologies and thus is appropriate to describe unique and under-studied phenomenological experiences of untenured female faculty in STEM.

Prior to the examination of data, and consistent with Levitt et al., (2018) and Spangler et al., (2011), the researchers developed a list of their own biases in regards to the study in an effort to be transparent about the influence of their own perspectives and appropriately limit the impact of these perspectives on the data collection and analysis process. The coding team identified potential biases surrounding the expected impact of sexism, increased work-life conflict (particularly for mothers), limited administrative support, increased work-related stress, and psychological distress. Additionally, prior to coding, the first and second authors who had previous experience with CQR-M, trained the coding team based on the recommendations of Spangler et al. (2011). Further following the coding recommendations of Spangler et al., (2011), the first author reviewed the first 30 participants to develop a start list for domains and categories. The second author then reviewed the list of domains and categories, and reviewed the data with the first author until consensus was reached for the first 30 participants. The coding team was then brought together to discuss each domain and category and to practice on several transcripts to ensure a common understanding of each code. Only after reaching high agreement did the coding teams separate. There were a total of three teams, with two coders per team. The individual teams reviewed 15 responses at a time, with the first and second authors revisiting and reviewing all codes before meeting as a group to reach consensus. Modification of the domains and categories was adjusted throughout the coding process via consensus of the coding team.

Coding Team and Positionality Statement

The coding team consisted of the six individuals: two White, cisgender, heterosexual, female, early career professors of counseling psychology, and four graduate students in counseling psychology (two cisgender women, two cisgender men; two White, one Black, and one Latinx; all identified as heterosexual). The first and second authors have experiences in academia and at the time of coding were both employed as assistant professors at mid-sized universities, with young children. Both women have personal experience in navigating the effects of COVID-19 on pursuing tenure and managing family responsibilities. In regards to training, both women have expertise in research surrounding the career development of women, and advocate for the inclusion and equity of women in STEM. Thus, the primary researchers have both lived experiences, and content knowledge influencing their analysis and interpretation of findings.
**Results**

The first and second author separately reviewed the first 30 participants to develop a start list of domains and categories. Three initial domains were reviewed: Supports and Coping during COVID-19, The Impact of COVID-19 on the Tenure Journey/Work, and Work-Family Enrichment and Conflict. Consistent with best practices in CQR-M (Spanger et al., 2011) and qualitative research (Levitt et al., 2018), the data was analyzed through an iterative coding process. Participants’ voices were highlighted by including sample quotes illustrative of the domains and categories (See Tables 1, 2, and 3). Response frequencies were generated in accordance with Spangler et al. (2011). The authors suggest dividing the frequency of each category or subcategory by the total number or responses.

**Supports, Needs, and Coping Strategies During COVID-19**

In the first domain, participants expounded on available supports, coping, and needed resources in the wake of the global pandemic. Participants noted several categories of available supports they utilized. Sample categories included family supports (e.g., having supportive people or childcare), work supports (e.g., IT support and reduced job expectations), and general supports that seemed to transcend work and family domains (e.g., videoconferencing and psychological and behavioral self-care). Forty-nine participants (58% of sample) reported receiving support through institutional policy. These institutional-level supports included postponement of annual tenure evaluations, additional leave time, and financial support. Additionally, many participants (26.19%) mentioned a tenure clock extension as an institutional support. While reports of a tenure extension were consistent, the participants’ reactions and acceptance to this support varied. While some were relieved, “[t]he university has been extremely supportive: providing an extension to our tenure clocks; ” others expressed conflicting responses, “[t]hey offered a tenure clock extension to all assistant professors to help us cope, but then there is pressure to take this even though I don’t want it.” Others noted that adding an extra year to their tenure process has caused anxiety or fear. Participants who described fear and anxiety cited the life-work conflicts that would result from an additional year of the tenure process. One participant described, “but also anxiety because it is another year until I can gain that security of tenure for my family.”

| Table 1. Domains and Categories. |
|----------------------------------|
| **Supports and Coping during COVID-19** | **n** | **%** |
| **Work Support** | | |
| Supportive professional network | 29 | 35% |
| Communication/transparency of process | 13 | 15% |
| Institutional policies | 49 | 58% |
| IT support | 6 | 7% |
| Work continuity | 12 | 14% |
| Reduced work expectations | 6 | 7% |
| **Needed/Desired Resources** | | 40.48% |
| **Social/Emotional Supports** | | |
| Video conferencing both for work and personal connections | 8 | 10% |
| Psychological and behavioral self-care | 13 | 15% |
| **Personal Supports** | | |
| Supportive personal network | 11 | 13% |
In addition to tenure extensions and institutional policy supports, many participants reported work support in the form of supportive colleagues and professional networks. One participant noted, “I have had wonderful and cathartic discussions with other faculty I know at other institutions about what they’re going through.” Others similarly were grateful for their support systems in their fields via online social media platforms and professional organizations. A number of participants described activities hosted within their own departments that served as a supportive work network (35%). Interestingly, one participant described weekly department meetings with faculty members that included paid mindfulness meditation instructors. Lastly, some participants highlighted the combined benefits of supportive factors in her work environment as well her own self-care strategies used to reduce her own high expectations:

The blog post “Please Do A Bad Job Of Putting Your Courses Online” by Rebecca Barrett-Fox was really transformative. I wasn’t sleeping because my mind was constantly racing about how to make my classes as engaging and robust online, with only about a week to make those changes. My chair has been very supportive with coping with COVID-19, touching base with us to answer any questions. Our university’s Center for Teaching and Learning also did a number of seminars about how to use Zoom,

| Table 2. Domains and Categories. |
|----------------------------------|
| Impact of COVID-19 on Tenure Journey | n | % |
| **Impacts on Research** | | |
| General research concerns | 14 | 17% |
| Presentation or travel opportunities jeopardized or canceled | 5 | 6% |
| Funding opportunities | 14 | 17% |
| Publication productivity negatively affected | 17 | 20% |
| Facilities, lab, and/or research materials loss | 29 | 35% |
| **Impact of Working from Home** | | |
| General adjustment to working from home | 3 | 4% |
| Lost work connections | 3 | 4% |
| Children at home affecting productivity | 32 | 38% |
| Increased Psychological, Familial, or Personal Stress | 35 | 41.67% |
| **Impact on Teaching** | | |
| General teaching concerns | 4 | 5% |
| Specifically online modality | 24 | 29% |
| **Minimal Tenure/Work Impact** | | |
| Minimal consequences/impact buffered | 10 | 12% |
| Partner or other provider helps with childcare/no children | 3 | 4% |
| In last phase of tenure | 13 | 15% |
| Positive coping/resilience | 1 | 1% |
| **Student Concerns** | | |
| General institutional concerns | 3 | 4% |
| Job security | 3 | 4% |
| Lack of communication | 3 | 4% |
| Administrative task-related concerns | 8 | 9.52% |
| **Positive Tenure/Work Impact** | | |
| General positive experiences | 2 | 2% |
| Scientific research more visible | 1 | 1% |

In addition to tenure extensions and institutional policy supports, many participants reported work support in the form of supportive colleagues and professional networks. One participant noted, “I have had wonderful and cathartic discussions with other faculty I know at other institutions about what they’re going through.” Others similarly were grateful for their support systems in their fields via online social media platforms and professional organizations. A number of participants described activities hosted within their own departments that served as a supportive work network (35%). Interestingly, one participant described weekly department meetings with faculty members that included paid mindfulness meditation instructors. Lastly, some participants highlighted the combined benefits of supportive factors in her work environment as well her own self-care strategies used to reduce her own high expectations:
etc. during the week of transitioning between face-to-face to online learning. The issue wasn’t that I didn’t feel supported; the issue was that I was putting too much pressure on myself to make these changes and create classes that would normally take me a month to finesse and go through with a fine toothed comb.

Thirty-four of the 84 participants (40.48%) identified a number of needed or desired resources that they did not have at their disposal during this time of crisis, including financial support (e.g., for teaching or grant continuity), and changes to the U.S. infrastructure that provide support to vulnerable populations. Several participants noted the financial hardship affecting their research. For example, one participant explained,

However, I’m running out of money on my start-up (used to pay my staff), and I would really appreciate a refund of that money so that I can continue to pay my staff to collect the data after the pandemic that they should have been collecting during the pandemic.

In addition to this participant, other participants noted that they needed or desired resources ranging from general support to specific needs. Participants included novel requests, including support for the provision of childcare, greater technological support, and mental health support. Notably, several participants also requested support for their graduate students. Multiple participants reported needing something more than resources or assistance; many listed a need for validation. Whether this validation came through the need for “acknowledgment” or for their university to “realize” the reality of the situation, multiple participants explained this desired understanding. One participant stated, “What would be useful is some sort of acknowledgment of the reduced productivity that we all are experiencing.”

Beyond these major areas of available supports and desired needs, participants noted several other coping strategies they were able to utilize during these challenging times. Some individuals (15%) identified psychological and behavioral self-care routines that they had recently begun. For example, four participants shared about their new yoga routines, “Another resource is the free

Table 3. Domains and Categories.

| Work Family Enrichment and Conflict                  | n  | %  |
|------------------------------------------------------|----|----|
| Work and Family Conflict                             |    |    |
| Incompatibility/Tension between academic work and family | 27 | 32%|
| Family → work conflict                                | 19 | 23%|
| Work → family conflict                                | 45 | 54%|
| Work and Family Enrichment                           |    |    |
| Nonspecific enrichment                                | 1  | 1% |
| Family—Work enrichment                                | 24 | 29%|
| Family prioritized over work                          | 4  | 5% |
| Work → family enrichment                              | 4  | 5% |
| Personal Issues and Internal Dynamics                 |    |    |
| Personal circumstances                                | 3  | 4% |
| Being single                                          | 4  | 5% |
| Negative emotions/responses                           | 6  | 7% |
| Positive emotions/responses                           | 5  | 6% |
| Little or no enrichment or conflict                   | 3  | 4% |
| MISC                                                  |    |    |
| Miscellaneous                                         | 4  | 4.76%|

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yoga channels on youtube to give me a positive healthy routine that is relatively easy to implement at the moment.” Some participants (14%) reported relief from decreased work responsibility while still continuing to be able to work and earn an income, while other individuals (7%) found support in IT support and technology-based connections (e.g., video conferences with colleagues and/or family).

**Impact of COVID-19 on Tenure Journey**

When asked about the impact of COVID-19 on the tenure journey, faculty expressed concerns relative to childcare. Given that 55% of the total sample had children, this finding suggests that approximately 70% of participants with children reported problems with productivity at home during COVID-19 that affected their tenure journey. For participants with young children tasked with childcare, the task of having to supervise children appears to have hamstrung participants’ ability to dedicate time to academic tasks. One participant noted that working from home as a tenure-track faculty has resulted in added difficulty relative to being able to balance the many responsibilities one undertakes when working towards tenure. According to that participant: “Because of COVID-19, my family is at home and it is more difficult to balance family responsibilities with work responsibilities. I am working when I can, but I have less hours to devote to my work. I am working late at night and over the weekend to make up for time, but it is not possible to do everything that I did before.” Additionally, lack of empathetic understanding from senior faculty who are without childcare responsibilities nullifies any efforts made to be productive in this time and “causes a lot of anxiety.” For example, a participant had this to say:

> I have a 3-year-old. Now, instead of ~9–10 h/day working I get 4–6 h/day. I don’t get to work anywhere as much as I want to or as much as I need to. With COVID shutdowns of daycare and my lab. (most of our work is experimental, hands-on work), I for the first time really feel like external pressures about work exceed my capacity to meet them. Before, with an operating lab. and daycare for my toddler, I felt like my standards and my curiosity drove everything and the external measures were easily met in that pursuit. Now, I can see external ideas about what I should accomplish that I don’t feel are achievable—for example, “Now is a great time to write grants!” says some senior faculty in leadership who either never had responsibility for children or has forgotten what that entails. No, no it is not a good time to write grants. Wtf?

Under this domain many participants (42%) also described an increase in psychological, familial and personal stress. One participant shared, “I am exhausted, frustrated, stressed and unable to get done what is typically expected of me, while I see childless people enjoying this time and excelling.” Paired with the personal and professional barriers brought on by COVID-19, another participant noted the inevitable adverse mental health impact brought on by the pandemic:

> Just terrible. My partner and I are separated by at home orders. Our families are both quite far away from us. My job applications have been put on hold due to COVID 19—my current institution is on the brink of failure to exist thanks to the economic downturn, also related to COVID-19. When I finish teaching (online) in May, I will not only be separated from all my family and alone, but also may be unemployed. Facing a recession and a more challenging road ahead to get back on the tenure track. I could not dream more about going back in time to not have quit my southern California position. There I would not be in one of my current dilemmas.

Participants also detailed concerns relative to the closure of facilities and labs resulting in loss of research material (35%). For example, one participant noted: “As experimental work is very
important in my work, research is on hold to a significant amount.” Trying to publish papers and make time for grant proposal writing, while teleworking has been an identified area of struggle for many untenured female STEM faculty. Relative to loss of publications and grant writing delays another participant noted: “My research is completely wet lab experimental, so my lab is shut down. Students can not keep collecting samples at expected time points. This will prevent me from having preliminary data expected for proposals I was going to submit this summer and will delay publications.” Some participants also highlighted specific concerns related to the online modality (29%). Notably, many faculty expressed student concerns (27%), highlighting both a concern for the loss of contributions to research but also their well-being and mental health. For example, one participant noted: “If the lab remains closed to standard research for much longer, many students’ mental health will deteriorate as they feel they are not progressing in their research. Ultimately, their graduation could be delayed and we could lose funding sources.” Participants also noted that the pandemic had affected their research pursuits, citing diminished publication productivity (20%), general research concerns (17%) and reduction in funding opportunities (17%). While a handful of participants (6%) described cancellation of conferences or having to cancel work related travel, thus inhibiting professional development. Many participants described the challenging experience of working from home, with many participants noting that children were a significant issue impacting productivity. Interestingly, for a subset of participants the pandemic seemed to have a minimal impact on their tenure journey. Participants noted various reasons for this including feeling as if they were close to going up for tenure (15%). However, some participants indicated that they were not yet sure as to whether or not they would experience consequences as it was too soon to tell (14%). Others felt that any adverse impact from the pandemic was buffered (12%). Additionally, due to the transition to remote work a number of participants reported administrative task concerns (10%) like serving on committees.

**Work-Family Conflict and Enrichment**

Consistent with literature on work-family conflict and enrichment among academics (e.g., Jijena-Michel & Jijena Michel, 2012), many participants identified the struggles and strengths of balancing family with their tenure journey. More than half of participants (54%) reported experiencing work as causing conflict in their family life. For example, one participant noted, “When I am stressed I feel like I am not doing enough for anyone—there is always more work to be done, I am missing something with my kids—a story, a hug, etc., and then I am not making enough time for my husband.” In the work-family conflict domain, approximately one third of participants (32%) reported a general incompatibility between work and family. For instance, another participant with young children stated, “I never have enough time for my children or my work. I also don’t have enough ability to focus on either side of my life properly.” Last, 23% of participants identified family causing distress at work, or within the tenure journey, as evidenced by this participant who expressed, “I had a baby in 2018. Spending time with her takes time that was previously used in research. Also, grandparents are visiting more, dealing with family is time and energy consuming.”

To a lesser extent, participants identified enrichment or positive processes in the work-family interface, with 29 percent of participants reporting that family enriches their work or tenure journey. One participant commented, “I appreciate that I am at a school where family is valued, and I think that bringing family to campus events is actually positive for my tenure process because it is seen as a sign of commitment to our campus community.” A handful of participants also identified prioritizing family over work as a positive experience (5%), or identified how work enriches their family life (5%). For instance, one participant stated, “I am passionate about teaching and it brings a whole lot of meaning to my life.” Some participants discussed personal
stressors or dynamics related to the work-family relationship and tenure, including personal issues or dynamics (4%), being single (5%), and other negative (7%) or positive emotional responses (6%). See Table 3 for additional themes that were mentioned at a low frequency.

Discussion

In summary, the current findings enumerated a host of supports for untenured female academics in STEM during the COVID-19 pandemic, described how untenured female faculty in STEM experienced the work-family interface during the national crisis, and highlighted consequences of COVID-19 on participants’ tenure journeys. The academic women in the current study described having to balance tenure, work, and personal responsibilities, all while being underrepresented in academia. The current study also tentatively indicates that untenured female-identifying with children may be particularly affected, with 70% of participants with children at home reporting a negative impact when asked about how COVID-19 affected their work/tenure journey.

Overall, the results underscore a host of missed opportunities for higher education and governmental institutions to support female faculty in STEM, and in many cases couples and families. These findings should be interpreted in the context of social and economic theories that necessitate that families attain full-time childcare help for women to work full-time. For example, in the economic treatise *Who Cooked Adam Smith's Dinner?* Marçal (2013) highlighted a complex network of care and unpaid labor that undergirds a capitalist economy. She challenges the popular notion of the “invisible hand” that is described in capitalism (i.e., the economic benefits of self-interest) and instead suggests that the “invisible hand” was Adam Smith’s mother, who served the “father of capitalism” dinner nightly. Marçal noted, “Adam Smith only succeeded in answering half of the fundamental questions of economics. He didn’t get his dinner only because the tradesmen served their own self-interests through trade. Adam Smith got his dinner because his mother made sure it was on the table every evening” (p. 17). In the context of COVID-19 pandemic, our results highlighted how many female faculty mothers in STEM lost childcare support, and disproportionately engaged in additional unpaid labor (i.e., childcare, homeschool, or other domestic tasks) to help their families survive. Thus, the current findings highlight the drastic negative effects of COVID-19 on female academics, and particularly academic mothers in STEM. For example, the findings articulated myriad problems like increased stress, interruptions in research, issues with childcare, and a host of other issues all of which should be interpreted in the context of a global patriarchal economy that devalues domestic labor. Participants clearly described how the pandemic exacerbated existing challenges, particularly themes that emerged in Table 1 in terms of needed supports and resources, and Table 3’s description of work-family conflict. The results indicated a host of specific institutional policies that may support female-academics in STEM. For example, while the tenure clock policy highlighted was described as a support by many participants, research indicates that stopping the tenure clock may negatively impact salary for women and men (Manchester et al., 2013). Interestingly, Mason et al. (2013) argued that universities should offer automatic stop-the-clock penalties for mothers and fathers to stay on the tenure journey. The authors suggested supportive policies in academia including paid childcare (e.g., emergency childcare and a childcare center), a part-time track, and paid parental leave for fathers and mothers. They argued that policies are not enough for enacting changes for female tenure-track faculty; instead highlighting the following: the necessity of cultural changes for males as well, combating pregnancy and gender discrimination, Title IX compliance, and engaging high level administrators are needed to enforce the policies. To promote gender equity in academia, Malsich & colleagues (2020) provided an extensive list of questions to engage in an honest conversation in academia specific to teaching, research, and service. For example, “How many courses were you teaching during Spring 2020? Was access to their lab reduced? Did the
scope of service change during 2020? ” (Malisch et al., 2020). While these questions are certainly helpful, the underlying economic, social, and political tension highlighted by Marcal (2013) is exemplified and exacerbated by the COVID-19 pandemic as it continues to highlight underlying structural discrepancies in unpaid labor.

Given that participants in the current study overwhelmingly experienced work-family conflict and significant pressures due to the COVID-19 pandemic, society at large needs to assess the ongoing issue of full-time domestic work required for female-identifying faculty to work full-time. As Marcal (2013) commented, “Who cleans the cleaner’s house? Who takes care of the nanny’s daughter? These aren’t just rhetorical questions, they are issues where the answer can only be found by following a complicated network of care wrapped around the global economy” (p. 57). For many female-identified STEM faculty, the pandemic unexpectedly transformed the fragile work-family enterprise that is sustained by paid childcare or domestic help, which is often staffed by other women. In one sample, STEM women faculty, of whom 97.2% were in a full-time position, those who had children living at home (57%) reported providing an average of 77.6% of the family’s childcare themselves. Remarkably, women worked 43.1 hours per week on average, with only those with children under 5 years old reporting fewer hours per week (33.7 hours; Krukowski et al., 2021). These results, as well as the qualitative accounts provided by participants in the current study, highlight the staggering amount of work academic mothers have put in across work and family contexts during the COVID-19 pandemic. Another important consideration in interpreting the findings is a body of research that suggests women may “leave before they leave,” making career sacrifices for partner and family when making career-related decisions (Ganginis Del Pino et al., 2013). Thus, one possibility is that in the context of the pandemic, female-identifying faculty in STEM made difficult and complex choices related to family and domestic responsibilities that undermined their tenure journey. For example, the work-family conflict category highlighted a range of difficult choices that emerged when participants experienced tensions and conflict between investing in work and family.

These findings support the suggestion of Autin et al. (2020) that working from home during the COVID-19 pandemic would have detrimental impacts on work-life balance and make caregiving responsibilities more difficult. Results of the current study indicated that the COVID-19 pandemic and school-shutdowns disrupted research for many participants, negatively altering their tenure trajectory. These newly identified contextual barriers (institutional, systemic, personal, familial, and psychological) as a result of COVID-19 pose even greater hurdles for untenured women in STEM in movement towards their career goals and attainment of tenure, above and beyond the already often arduous pathway women face in STEM academia. Of particular importance for untenured STEM faculty is the shutdown of labs and loss of research productivity. The findings of the current study regarding decreased research productivity complement preliminary research that found that female STEM faculty across the U.S. submitted significantly fewer manuscripts for publication as either a first author or co-author during the first several months of the pandemic compared to several months prior to the pandemic, while there was no difference between time points for men (Krukowski et al., 2021). Untenured faculty are in a distinctly vulnerable position as they have a limited time to demonstrate successful scholarship, as these accomplishments are often heavily weighted for tenure and promotion, and ultimately affect their long-term job security. This is also particularly concerning given the range of deleterious outcomes associated with the lack of meaningful and decent work (e.g., Duffy et al., 2016). Moreover, the current study highlights important outcomes of decent work according to PWT, as women noted a number of issues related to social connection, survival needs, and work-fulfillment. In addition, nearly half of our sample reported concerns related to well-being, within and outside the context of work, including increased psychological, familial and personal stress, which PWT emphasizes as having reciprocal relationship with vocational outcomes (Duffy et al., 2016). The current findings also
support expectations that mental health concerns would increase among workers as a result of the COVID-19 pandemic through stressors such as job insecurity and isolation (Autin et al., 2020). Applied to the current study, the well-being of female academics appeared to be reciprocally linked to work outcomes like the tenure journey.

Historically, many psychological theories on work, family, gender, and multiple roles have not adequately reflected the reality for the dynamically shifting realities of work and family among U.S. couples (Barnett & Hyde, 2001). Interestingly, our research findings were consistent with other findings that have found work to family conflict, and family to work enrichment were regarded as more critical for well-being as compared to family to work conflict or work to family enrichment (Gareis et al., 2009). In light of the work to family and family to work conflict noted above, it is important to note that intersectionalities also create an added layer of burden experienced by female tenure-track faculty. The inevitable, unfortunate solution for some female faculty is having to sacrifice some of their responsibilities to give room for some level of equilibrium in their experience. In the context of PWT, it appears that limitations in work-life balance created by mandates to work from home may have reduced access to decent work and contributed to thwarted self-determination needs (Duffy et al., 2016). Specifically, although many participants may have found their research, for example, to be intrinsically motivating, they were prevented from engaging in this work at their previous levels due to the constraints on their time and energy from working at home. Additionally, the COVID-19 pandemic can be expected to continue impacting STEM women faculty through the projected recession that will affect the individual’s chances of regaining employment for those who chose to leave their position or were terminated due to economic constraints during the pandemic. PWT considers the role of societal economic conditions as a moderator in the prediction of obtaining decent work (Duffy et al., 2016), thus offering a framework for understanding the current experiences of women in tenure-track STEM academic positions as well as predictions for future outcomes.

Future Directions and Limitations

Based on the preliminary findings, future research may examine individuals in STEM administrative roles and cabinet-level stakeholders, particularly in understanding and challenging their ability to effect changes on an institutional level to promote equity and inclusion in the “Ivory Tower.” Future research may also amplify the voices of STEM faculty of color and STEM academic mothers, as well as the effectiveness of specific policies that may promote women’s career development and tenure journey. The relationships between social and cultural forces (e.g., policies and norms), the work-family interface, and various supportive resources for female academics in STEM to continue to plug the “leaky pipeline” (Autin et al., 2020), are also important areas of focus based on the current findings. Also, it is critical to understand the experience of male academics, who may be inadvertently benefiting from certain policies or norms in the workplace, but similarly suffering from prescriptive and restrictive gender roles. Future studies might also examine diverse groups of female academics in STEM by studying work-family conflict and enrichment from an intersectionality lens. Lastly it is imperative to continue to monitor the long-term effects of the COVID-19 pandemic on the vocational outcomes of women, and of STEM faculty in particular.

There are some limitations that should be noted in the current study. First, as a qualitative study, conclusions about causality may not be drawn. While the sample of women in the current study was well above national averages regarding racial/ethnic makeup of academic women of color in STEM (NSF, 2019), there were a limited number of women of color in the study, thus making it hard to draw inferences about this population. Also, given that the COVID-19 pandemic created a crisis for many academic women in STEM, it is possible that the data only represents women who
could find the time to complete the questionnaires, thus omitting a broader swath of the population. Given the high level of stress and conflict experienced by the participants in the study, it is possible that the true impact of the pandemic on academic women in STEM was even more pernicious. In conclusion, findings from this study provided an important description of the ways in which the current COVID-19 pandemic is impacting the lives of untenured STEM female faculty, elucidating how to reduce inequities, and best support these women during this critical period in their career development.

**Implications**

The current study offers several implications for supporting female faculty in STEM and their path towards tenure. From an administrative standpoint, the results suggest that there may be an added advantage to prioritizing certain policies (e.g., reduced tenure expectations, tenure clock stop) or resources (e.g., mentoring from female faculty) to support academic women in STEM. The current results highlight how such policies may help to alleviate some of the barriers and detrimental consequences that have emerged for women in STEM during the COVID-19 pandemic, as a function of their gender identity and roles, and prejudice existing within the institutions and policies in which they reside. This may provide female faculty with the time and support needed to increase research productivity during a time in which their access to labs, students, and time is restricted.

The current results also emphasize the significance of work-life balance, with female faculty in STEM not having the same latitude to prioritize the former as their male counterparts. As a result of their caretaking role, women in STEM are left vulnerable to getting behind in the tenure process, and unfairly evaluated. This highlights the importance of having institutional policies and administrative support that offers paid childcare, flexible work scheduling, and paid leave to help decrease the tension between work and family, thus increasing the bandwidth for female faculty in STEM to meet the demands of their position and tenure.

Outside of policy changes and in terms of clinical and social advocacy implications, targeting interventions at minimizing work-to-family conflict, and enhancing family-to-work enrichment may be most efficient at promoting career development and optimizing well-being among female-identifying untenured STEM faculty. Moreover, given the stressors and mental health concerns emerging from such conflicts, upper administration would benefit from identifying and providing resources to increase coping skills and stress management in female faculty in the tenure process. In conclusion, findings from this study provided an important description of the ways in which the current COVID-19 pandemic is impacting the lives of untenured STEM female faculty, elucidating how to reduce inequities, and best support these women during this critical period in their career development.

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References

Aubry, L. M., Laverty, T. M., & Ma, Z. (2021). Impacts of COVID-19 on ecology and evolutionary biology faculty in the United States. *Ecological Applications, 31*, e2265. https://doi.org/10.1002/eap.2265

Autin, K. L., Blustein, D. L., Ali, S. R., & Garriott, P. O. (2020). Career development impacts of COVID-19: Practice and policy recommendations. *Journal of Career Development, 47*, 487–494. https://doi.org/10.1177/089485320944486

Barnett, R. C., & Hyde, J. S. (2001). Women, men, work, and family: An expansionist theory. *American Psychologist, 56*(10), 781–796. https://doi.org/10.1037/0003-066X.56.10.781

Blackwell, L. V., Snyder, L. A., & Mavriplis, C. (2009). Diverse faculty in STEM fields: Attitudes, performance, and fair treatment. *Journal of Diversity in Higher Education, 2*(4), 195–205. https://doi.org/10.1037/a0016974

Casad, B. J., Franks, J. E., Garasky, C. E., Kittleman, M. M., Roesler, A. C., Hall, D. Y., et al (2021). Gender inequality in academia: Problems and solutions for women faculty in STEM. *Journal of Neuroscience Research, 99*(1), 13–23. https://doi-org.ezproxy.uakron.edu:2443/10.1002/jnr.24631

Collins, C., Landivar, L. C., Ruppanner, L., & Scarborough, W. J. (2020). COVID-19 and the gender gap in work hours. *Gender, Work, & Organization, 28*, 101-112. https://doi.org/10.1177/0894845320944486

Duffy, R. D., Blustein, D. L., Diemer, M. A., & Autin, K. L. (2016). The psychology of working theory. *Journal of Counseling Psychology, 63*(2), 127–148. http://dx.doi.org/10.1037/cou0000140

Flahrety, C. (April 21, 2020). No room of one’s own: Early submission data suggest COVID-19 is taking women’s productivity. Inside Higher Education. https://www.insidehighered.com/news/2020/04/21/early-journal-submission-data-suggest-covid-19-tankins-womens-research-productivity

Gabster, B., vanDaalen, K., Dhatt, R., & Barry, M. (2020). Challenges for the female academic during the COVID-19 pandemic. *Lancet, 359*, 1968–1969. https://doi.org/10.1016/S0140-6736(20)31411-2.

Ganginis Del Pino, H. V., O’Brien, K. M., Mereish, E., & Miller, M. J. (2013). “Leaving before she leaves”: Considering future family when making career plans. *Journal of Counseling Psychology, 60*(3), 462–470. https://doi.org/10.1037/a0032651

Gareis, K. C., Barnett, R. C., Ertel, K. A., & Berkman, L. F. (2009). Work-family enrichment and conflict: Additive effects, buffering, or balance? *Journal of Medicinal Food, 71*(3), 696–707. https://doi.org/10.1111/j.1741-3737.2009.00627.x

Greenhaus, J. H., & Powell, G. N. (2006). When work and family are allies: A theory of work-family enrichment. *The Academy of Management Review, 31*(1), 72–92. https://doi.org/10.2307/20159186

Heggenness, M.L., & Fields, J.M. (August 18, 2020). Working moms bear brunt of home schooling while working during COVID-19. United States Census Bureau. https://www.census.gov/library/stories/2020/08/parents-juggle-work-and-child-care-during-pandemic.html

Jijena-Michel, R. D., & Jijena Michel, C. E. (2012). The relationship between work-family conflict and work-family enrichment of university professors. *Journal of Behavioural Sciences, 22*(2), 1–12. http://pu.edu.pk/home/journal/24/V_22_No_2_2012.html

Kachchaf, R., Ko, L., Hodari, A., & Ong, M. (2015). Career–life balance for women of color: Experiences in science and engineering academia. *Journal of Diversity in Higher Education, 8*(3), 175–191. https://doi.org/10.1037/a0039068

Kim, E., & Patterson, S., (2020). The pandemic and gender inequality in academia. Retrieved from http://dx.doi.org/10.2139/ssrn.3666587

Krukowski, R. A., Jagsi, R., & Cardel, M. I. (2021). Academic productivity differences by gender and child age in science, technology, engineering, mathematics, and medicine faculty during the COVID-19 pandemic. *Journal of Women’s Health, 30*(3), 341–347. https://doi.org/10.1089/jwh.2020.8710

Levitt, H. M., Bamberg, M., Creswell, J. W., Frost, D. M., Josselson, R., & Suárez-Orozco, C. (2018). Journal article reporting standards for qualitative primary, qualitative meta-analytic, and mixed methods
research in psychology: The APA Publications and Communications Board task force report. *American Psychologist, 73*, 26–46. http://dx.doi.org/10.1037/amp0000151

Liu, S., N. C., Brown, S. E. V., & Sabat, I. E. (2019). Patching the “leaky pipeline”: Interventions for women of color faculty in STEM academia. *Archives of Scientific Psychology, 7*, 32–39. http://dx.doi.org/10.1037/arc0000062

Malisch, J., Harris, B., Sherrr, S., Lewis, K., Shepherd, S., McCarthy, P., & Deitloff, J. (2020, July 07). Opinion: In the wake of COVID-19, academia needs new solutions to ensure gender equity. Retrieved December 05, 2020, from https://www.pnas.org/content/117/27/15378

Manchester, C. F., Leslie, L. M., & Kramer, A. (2013). Is the clock still ticking? an evaluation of the consequences of stopping the tenure clock. *Industrial and Labor Relations Review, 66*(1), 3–31. https://doi.org/10.1177/001979391306600101

Maranto, C. L., & Griffin, A. E. (2011). The antecedents of a ‘chilly climate’ for women faculty in higher education. *Human Relations, 64*, 139–159. https://doi.org/10.1177/0018726710377932

Marcel, K. (2013). *Who cooked Adam Smith’s Dinner*. Pegasus Books.

Mason, M. A., Wolfinger, N. H., & Goulden, M. (2013). *Do babies matter? Gender and family in the ivory tower*. Rutgers University Press.

McCutcheon, J. M., & Morrison, M. A. (2018). It’s “like walking on broken glass”: Pan-Canadian reflections on work–family conflict from psychology women faculty and graduate students. *Feminism & Psychology, 28*(2), 231–252. https://doi.org/10.1177/0959353517739641

National Science Board. (2018). *Science and engineering indicators 2018 (NSB-2018-1)*. Retrieved from https://www.nsf.gov/statistics/indicators/

National Science Foundation, National Center for Science and Engineering Statistics. (2019). *Women, minorities, and persons with disabilities in science and engineering: 2019 (NSF 19-304)*. Retrieved from https://www.nsf.gov/statistics/wmpd

Petersen, A. (2020, September 22). *How burnout became the norm for American parents*. The New York Times. https://www.nytimes.com/2020/09/22/parenting/parental-burnout-pandemic.html

Schwartz, J. (1993, September 30). Obesity affects economic, social status. The Washington Post, A1, A4.

Sheu, H. B., Lent, R. W., Brown, S. D., Miller, M. J., Hennessy, K. D., & Duffy, R. D. (2010). Testing the choice model of social cognitive career theory across Holland themes: A meta-analytic path analysis. *Journal of Vocational Behavior, 76*(2), 252–264. https://doi.org/10.1016/j.jvb.2009.10.015

Spangler, P.T., Liu, J., & Hill, C.E. (2011). Consensual qualitative research for Simple Qualitative Data: An introduction to CQR-M. In C. Hill (Ed.), *Consensual qualitative research: A practice resource for investigating social science phenomena* (pp 269–283). APA.

Toffoletti, K., & Starr, K. (2016). Women academics and work–life balance: Gendered discourses of work and care. *Gender, Work and Organization, 23*(5), 489–504. https://doi.org/10.1111/gwao.12133

United States Census Bureau. (2018). 2018 ACS 5-year estimates detailed tables (TableID B01003; B01001B, C, I). https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2017/

Ward, K., & Wolf-Wendel, L. (2004). Academic motherhood: Managing complex roles in research universities. *Review of Higher Education: Journal of the Association for the Study of Higher Education, 27*(2), 233–257. https://doi.org/10.1353/rhe.2003.0079

Woitowich, N. C., Jain, S., Arora, V. M., & Joffe, H. (2021). COVID-19 threatens progress toward gender equity within academic medicine. *Academic Medicine, 96*(6), 813–816. https://doi.org/10.1097/ACM.0000000000003782

Xu, Y. J. (2008). Gender disparity in STEM disciplines: A study of faculty attrition and turnover intentions. *Research in Higher Education, 49*, 607–624. https://doi.org/10.1007/s11162-008-9097-4

Ysseldyk, R., Greenaway, K. H., Hassinger, E., Zutrauen, S., Lintz, J., Bhatia, M. P., Frye, M., Starkenburg, E., & Tai, V. (2019). A leak in the academic pipeline: Identity and health among postdoctoral women. *Frontiers in Psychology, 10*. https://doi-org.steu.idm.oclc.org/10.3389/fpsyg.2019.01297.