

An Evidence-Based Approach to Covid-19 Pandemic Effects on Academics

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Social Sciences - Article

Keywords:

Posted Date: July 18th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1812476/v1>

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Abstract

We discuss our evidence-based approach to understanding and addressing the gendered impact of the pandemic on academics at Queen's University Belfast, a research-intensive Russell Group UK University. The study was a collaboration between the University-wide Queen's Gender Initiative, researchers, and Human Resources. A staff survey ran from 23 September until 30 October 2020, assessing academic productivity and personal factors including caring responsibilities, wellbeing, and time spent working. Data from 537 academics showed that multiple challenges were experienced with most of the day spent on work and caregiving tasks. The majority of worktime comprised teaching, at a cost to research productivity and personal wellbeing. These patterns were accentuated for female academics. From this holistic approach to understanding academics' challenges, recommendations were presented to the University's Executive Board and other high-level institutional committees. An Action Plan of sustainable solutions designed to mitigate the pandemic effect focused on promotion, research, workload support, and wellbeing. Furthermore, the findings directly informed policies to enhance working life, particularly in new models of flexible working. In summary, we report methodology to integrate research and centralized efforts to address the pandemic's impact on academics, using a gender lens and incorporating complementarity of work, home-life and wellbeing.

Introduction

The Covid-19 pandemic, its associated lockdowns, and self-isolation periods have posed significant challenges to many academics in terms of balancing family responsibilities while maintaining academic productivity and advancing careers. These challenges are likely to continue over coming months with periods of self-isolation and unpredictability in daily life. Furthermore, the impact to date may negatively offset career progression and persist for several years. While gender inequalities were present in academia before the pandemic¹, global crises typically exacerbate inequalities² with long-term effects³. Indeed, reports predict that the outlook for working parents is now worse than in 2020, particularly for those belonging to minority groups⁴⁻⁵. Universities have a responsibility to address this challenge in a systematic manner and, ideally, through a gender lens, to prevent long term negative effects on staff who were particularly affected⁶. Responding to this need, we document our evidence-based approach to understanding and addressing the gendered impact of the pandemic on academics at Queen's University Belfast, a research-intensive Russell Group University in the UK.

An increasing body of research is reporting gender inequalities in academic productivity during the pandemic⁷⁻¹⁰. These inequalities are likely to grow over time, given processes around publishing and securing research income. Unavoidable pauses in data collection when laboratories and research facilities were closed under lockdown restrictions will undoubtedly negatively impact publications and career milestones over the next few years, including outcomes of confirmation in post (tenure) and promotion¹¹. Research productivity has also been affected by the imperative to pivot to online delivery of teaching and develop new models of learning and assessment⁶. The increased time spent caregiving due to lockdown, home-schooling, and periods of self-isolation of family members has also affected academic research productivity⁸. Responsibility for dependants' wellbeing (and education) usually falls disproportionately on women, a trend that has increased during the pandemic¹²⁻¹³. In academia, women typically have disproportionately larger work commitments in

relation to labour-intensive teaching, supervision, pastoral care and administrative tasks¹⁴, further impacting research time. Perhaps unsurprisingly, the mental health impact for women was higher during the pandemic¹⁵⁻²⁰ potentially further affecting opportunities for research outcomes and future career progression.

While several studies have separately evaluated gender gaps during the pandemic, we adopted a holistic approach to understand the relationship between academic productivity, daily living, and wellbeing. We hypothesised that, while many academics will have challenges balancing family, research, and teaching with costs to their wellbeing and productivity, these difficulties will be more pronounced for women with caregiving responsibilities. We further hypothesised that women will be disproportionately affected, especially at early career stages, given relatively smaller collaborative networks and likelihood of having young children, consistent with Vincent-Lamarre and colleagues¹⁰.

Importantly, we not only document the impact of the pandemic on academic staff, but also describe the overall process, the data-driven recommendations, as well as their implementation and impact within the University. This paper therefore offers a potential model to address the gendered impact of the pandemic and related crises within academia.

Results

Demographics

Though the terms female and male are used when describing our sample, participants were asked to disclose their current gender, not their sex. A total of 537 academics who identified their gender responded: 201 males and 336 females. Six further participants preferred not to indicate their gender and were excluded from the analyses as the focus of this research was to apply a gender lens to the impact of the pandemic. Of these participants, 492 identified as White, 16 as BAME (Black, Asian, and Minority Ethnic), 26 as another ethnic group while 3 preferred not to say. In terms of academic grades, 213 were Lecturers (Assistant Professor), 153 Senior Lecturers and 43 Readers (Associate Professor) and 104 were Professors; 399 were on Research and Education (R&E) contracts and 138 on Education (Ed) contracts. Most respondents had caregiving responsibilities (254 caregivers of children, 28 of older dependants, 12 of persons with disabilities, 43 of multiple categories, and 9 of other categories), whereas 179 did not have dependants. Due to attrition, full datasets were obtained for 359 academics. Analyses were conducted on the available sample size, resulting in different *N*s for specific analyses.

Academic productivity

Responses demonstrated that academics' productivity (*N* = 461) suffered. On average, less than half of their research portfolio continued as normal, 33% was paused and 16% was stopped (Fig. 1a). These disadvantages were accentuated for females (*N* = 287), whose research portfolios were less likely than males' (*N* = 174) to continue as normal according to a two-tailed independent t-test, $t(459) = 2.09$, $p = 0.037$, Cohen's $d = 0.20$. Objective research productivity was also impaired (Fig. 1b), with females submitting fewer papers

than males on average as determined by a two-tailed independent t-test, $t(465) = 2.06$, $p = 0.04$, Cohen's $d = 0.20$. Differences between females and males in relation to submission of funding applications or conference submissions were not statistically significant (all p 's > 0.9).

Most academics also reported that their paper productivity ($N=472$), funding applications ($N=440$), and conference participation ($N=424$) had decreased (56%, 46%, and 75% respectively) during lockdown compared to the same period the year before (Fig. 1c). A small proportion of academics reported that their papers, funding applications, and conference participation increased (12%, 7%, and 3% respectively). There were no significant gender differences in productivity changes compared to the past year (all p 's > 0.7). Overall findings show that pandemic lockdowns had a negative effect on academic productivity across all areas, with female academics more likely to be affected in terms of publications and impairments to overall research portfolio.

Work and Daily Patterns

To investigate academics' work and home patterns and how they differed from pre-pandemic times, by gender, we conducted 2 (Gender: female vs. male) x 2 (during vs. pre-pandemic) mixed ANOVAs on self-estimated percentages of caregiving and work, respectively. Results are summarised in Figure 2. Overall, all academics completed a significantly greater percentage of their household's caregiving during the pandemic than before (Fig. 2a and 2b). Additionally, academics spent a significantly greater proportion of their day caregiving during the pandemic, while their time spent working remained high pre- and during the pandemic (around 56% of their day; Fig. 2a and 2b). Within their working hours, they spent more time on teaching (49% vs. 38% pre-pandemic), at the expense of their research (25% vs. 38% pre-pandemic) and citizenship time (11% vs. 15% pre-pandemic) which decreased during lockdown (Fig. 2c).

Compared to males, females spent significantly more time on caregiving (p 's < .001) and teaching ($p = .049$), and marginally less on research though this comparison was not statistically significant (see Fig. 2a). These main effects were qualified by significant interactions with gender for the caregiving dependent variables (% of caregiving within household $p = .008$; % of day spent caregiving $p = .004$). To explore these interactions, difference scores were calculated for proportion of caregiving within the household completed before vs. during the pandemic and percentage of day spent caregiving before vs. during the pandemic. Negative difference scores indicated more caregiving was completed during the pandemic. Observing these difference scores both females (proportion of caregiving $M = -9.16$; $SD = 19.67$; percentage of day caregiving $M = -9.23$; $SD = 14.36$) and males (proportion of caregiving $M = -4.13$; $SD = 16.54$; percentage of day caregiving $M = -5.19$; $SD = 11.23$) completed more caregiving during the pandemic. However, the increase in caregiving was more accentuated during vs. pre-pandemic for females compared to males according to two-tailed independent t-tests on these difference scores, relative both to other family members, $t(374.83) = 2.79$, $p = .005$, Cohen's $d = 0.27$, and to other tasks performed during the day, $t(351.75) = 3.03$, $p = .003$, Cohen's $d = 0.31$. Overall, academics experienced greater demands on their time due to increased caregiving responsibilities and teaching tasks, with female academics being more affected.

Burnout and Wellbeing

On average, when asked to think of their family and work commitments since March 2020, academics ($N=366$) reported feeling tired ($M = 3.86$, $SD = 0.89$), having difficulties sleeping ($M = 3.15$, $SD = 1.11$), feelings of failure ($M = 2.84$, $SD = 1.11$), feeling depressed ($M = 2.69$, $SD = 1.03$), and physically unwell ($M = 2.40$, $SD = 0.95$), with most scores around and above the scale midpoint of 3 (Fig. 3). According to two-tailed independent t-tests, females ($N=226$) expressed that they were significantly more tired, $t(364) = -4.05$, $p < 0.001$, Cohen's $d = -.44$, had more difficulties sleeping, $t(364) = -2.35$, $p = 0.020$, Cohen's $d = -.25$, and felt more like a failure, $t(364) = -2.82$, $p = 0.005$, Cohen's $d = -.30$, compared to males ($N=140$). Overall, the apparent increase in workload and need to balance work and home demands during the pandemic were associated with increased symptoms of burnout for academics, with females being more affected.

Testing a moderated mediation model

To obtain a holistic view of how academics' caregiving status, gender, and academic grade interacted to predict interrelated outcomes such as work and life patterns, burnout, and academic productivity, we tested a moderated mediation model (Fig. 4a; $N = 359$). Here, gender, moderated by caregiving status and academic grade, would predict the percentage of the day academics spent caregiving as well as their burnout, which in turn may drive (mediate) the effects on reduced academic productivity. The analysis was conducted using PROCESS Model 10 available for SPSS²¹ and results are summarised in Fig. 4b. As indicated by the conditional indirect effects suggesting moderated mediation, only our hypothesis around time spent caregiving as a mediator was supported. Female Lecturers (early career), $b = -0.04$, CI [-0.10, -0.00], Senior Lecturers and Readers (mid-career), $b = -0.04$, CI [-.09, -0.00], with caregiving responsibilities spent more time on caregiving tasks compared to males – for Lecturers $b = 8.77$, CI [3.09, 14.46] and Senior Lecturers and Readers $b = 8.09$, CI [3.18, 13.00] - which in turn led to lower academic productivity, $b = -0.005$, CI [-.01, -0.00]. In summary, the model showed that, early- and mid-career female academics' productivity was significantly impacted compared to males' due to increased time spent on caregiving responsibilities.

Discussion

Overall, our data suggested that most academics' productivity, work and life patterns, and wellbeing suffered, with female academics being more affected in some areas. Although gender differences may appear to be small, they are consequential especially for early career academics. Early gaps in productivity are likely to accumulate over time across an academic career, leading to growing gender inequality and suggesting the need for early intervention²².

Evidence-Based Recommendations

Findings of the survey were summarised in a report and presented to the University Executive Board, chaired by the Vice-Chancellor with membership including University Pro-Vice-Chancellors, the Registrar and Senior

Managers, responsible for the development and implementation of University strategic plans and action. We thus had the opportunity to impact change at the highest level of the University. Findings were also shared with individual Faculties and Schools, and online with the University community via a video presentation and the anonymised data report. The report included a data summary and interpretation in addition to key recommendations. Coincident with the survey report, the University implemented a Pulse survey, part of its ongoing programme of staff surveys, that was designed to better understand the working experience during the Covid-19 response. The findings of both surveys were used to develop a suite of recommendations which are summarised below:

1. Renewed commitment to core meeting hours of 10.00am to 4.00pm, where possible, for formal meetings and committees. Refinement of the number of meetings, scheduling and duration was recommended to prevent an “always on” culture and meeting burnout. New guidance to promote healthy working patterns was released by Human Resources.
2. Continue to develop our wellbeing and mental health support portfolio, particularly for those juggling work with home pressures such as caring and home-schooling.
3. Provide clarity in relation to our return to campus in line with the Northern Ireland Executive and Public Health Agency guidance, and reassurance of the wide range of safety measures in place.
4. On our return to campus, retain some of the flexible and blended working practices from lockdown working. Feedback from the surveys are informing the ongoing work of the Flexible Working Practices Working Group. This is linked to nurturing and embedding the new levels of trust that have grown during the pandemic in line with the University’s core values, ICARE (integrity, connected, ambition, respect, excellence).
5. Assess and seek to balance academic workloads. Findings from the surveys are informing the ongoing work of the Workload Allocation Working Group.
6. Implement measures within Academic Progression (Promotion) and Probation processes to mitigate the effect of lockdown on academic progression. Measures were implemented for 2020 and ‘Covid-19 memory’ will continue for at least 3 years. Application forms were revised to include a new section for applicants to summarize their lived experience during the pandemic (e.g., challenges balancing education/research/citizenship, whether research opportunities were enhanced or diminished and work-family issues). This new provision was highlighted in guidance documents and Academic Progression workshops.

7. Provide more opportunities for social interaction to improve connectivity and reduce feelings of isolation for some colleagues.

8. Alongside positive feedback on our communications (e.g., the COVID-19 FAQs resource on the University website), it was also highlighted where we can improve, including timing, messaging content and phrasing and the ways in which we communicate.

9. Further measures were recommended to mitigate the impact of the pandemic on research productivity for academics. As a result of the current survey findings, the Covid-19 Pandemic Research Enabling Fund (CP-REF), resourced via Department for the Economy (Northern Ireland) Covid-19 mitigation funds, was established by the University to support individuals whose research had been paused or significantly slowed due to the pandemic lockdown. Academics were invited to apply for grants, as individuals or as teams, that would be used to restart or re-establish research programmes that had been paused or negatively impacted by the pandemic. The application form included a section for applicants to highlight particular pandemic/lockdown related challenges to research productivity. In the first round of funding, grants were awarded to 43 individual academics (39 women and 9 men) and to five group applications.

Further impacts of the survey occurred during its launch and data analysis. The Queen's Gender Initiative (QGI) 'Engendering Solutions' project, which informed this survey, also conducted initial conversations/listening exercises with staff about the challenges of remote working and work-life. These conversations/listening exercises harnessed the experiences and thoughts of staff and enabled a gender lens to be used in other discussions. An important example was the development of guidance on the return of research staff/students to laboratories in which equal access was granted, regardless of individuals' seniority, project funder or the size of the project. This guidance also included considerations for timing of laboratory access in relation to the use of public transport, caring responsibilities, home-schooling and essential health and safety regulations.

The survey's findings (and that of the Pulse survey) and recommendations framed the development of the University's new Strategic Plan (Strategy 2030; see <https://www.qub.ac.uk/about/strategy/>) where a gender lens was informative for its central tenet of equality, diversity and inclusion. The conversation/listening exercise approach was adopted, and many people contributed to the shaping of the Strategy; an approach that was synergised by a new acceptance of a holistic framework, enabling staff to do their best work in a supportive and enabling environment.

Applying a Holistic, Empirical Approach

The last few years have taught us that public health and geopolitical crises can occur at any time and can impact individuals differently based on their gender and other characteristics such as caregiving status. Higher education institutions have a responsibility to respond to such crises not only for students but also staff, ensuring mitigations are put in place to minimise the impact. Based on our experience, we recommend that:

- Decisions should be made based on empirical data collected from staff, rather than assumptions about their experience and needs. While data can be qualitative and quantitative, it may be important to include quantitative components as this form of data is likely to be most impactful in decision making at management level.
- Data should be collected by looking holistically at staff's experiences, not just focusing on their academic productivity but also daily lives and wellbeing.
- Different departments, including Human Resources, should collaborate from the beginning of the process (survey design, data analysis, recommendations).
- Results should be disseminated not only to management in order to affect policy but also back to staff for improving transparency and a climate of trust.
- A gender-aware approach should be taken to capture the differential impact on different gender groups, although solutions will be provided for all staff.

Methods

The Queen's University Belfast Method

The project was initiated by the Queen's Gender Initiative (QGI), a University-wide forum that provides a route through which women's views on policies, practices and procedures are directed to senior management. During summer 2020, as part of its 'Engendering Solutions' project, QGI conducted consultations with a number of staff groups to learn about the challenges of remote working, work-life conflict and wellbeing. Based on the information from these listening exercises, QGI collaborated with academic researchers within the School of Psychology and Human Resources (HR) to develop a mixed-methods survey combining quantitative and qualitative data collection. For brevity we report quantitative findings, which are consistent with qualitative responses. Importantly, engaging HR enabled a centralised effort to ensure both uptake of the survey as well as support in implementing the findings and ensuring impact.

All University staff were invited to participate by completing an anonymous, online survey. The survey ran from 23 September - 30 October, 2020 and asked about experiences relating to the lockdown period from 23 March 2020. Although staff from all categories responded, here we focus on academic staff only.

Measures

Academic Productivity. Given that academic productivity is multifaceted, we used a combination of self-reported objective and subjective data. We asked academics how many papers they submitted during the

reporting period, how many grants they applied for as Principal Investigator (PI) and Co-Investigator (CI) and how many conferences they attended. We also asked them to rate the percentage of their research portfolio that continued as normal, that was paused, or stopped. Finally, we asked if their productivity had stayed the same, decreased, or increased compared to the same period in the preceding year. Outcomes from these measures are reported separately in initial analyses. In the final moderated mediation analysis, five measures (papers submitted, funding applications submitted as PI and CI, conferences attended, and the extent to which their portfolio continued as normal) were standardized and averaged into one index of academic productivity based on a factor analysis revealing that all items loaded on one factor.

Work and Life Patterns. We asked respondents to report the percentage of their day spent on caregiving and working. Of the time spent working, they also reported the percentage spent on research, teaching, citizenship (e.g., administration, management, leadership and engagement roles), and Covid-19 related administration tasks (e.g., serving on Operational Recovery Teams, student services). Academic participants answered all questions for both during and pre-pandemic, enabling a comparison with pre-pandemic work and life patterns. One exception was Covid-19 related administration tasks that did not exist pre-pandemic. We also inquired about the percentage of caregiving performed in their household relative to other family members, during and pre-pandemic.

Burnout and Wellbeing. Participants were asked to report how often they felt tired, depressed, physically unwell, had feelings of failure, and difficulty sleeping (items extracted from Malach-Pines²³) on a scale from 1 (never) to 5 (always).

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Declarations

Data availability statement

The dataset analysed during the current study is available from the corresponding author on reasonable request.

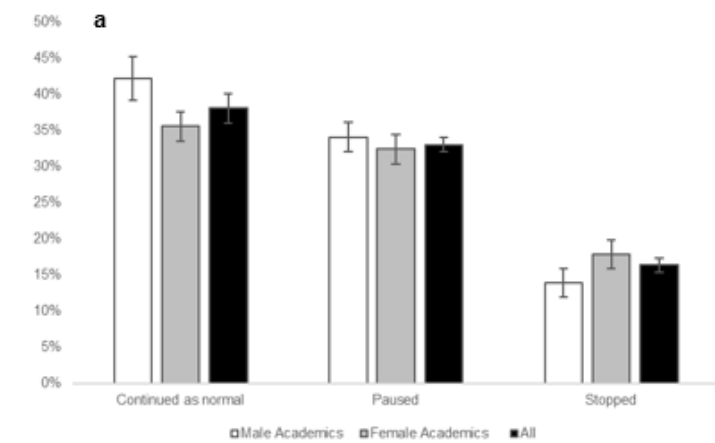
Competing interests

The authors declare no competing interests.

Additional Information

This study was ethically approved by the Engineering and Physical Sciences Faculty Research Ethics Committee at Queen's University Belfast (Ref: EPS 20_200). Participants provided informed consent to participate.

Figures



All N: 461: Female N: 287: Male N: 174

b

Objective productivity measures	All <i>M</i> (SD)	Female <i>M</i> (SD)	Male <i>M</i> (SD)
Papers submitted	1.73 (2.52)	1.54 (2.42)	2.03 (2.66)
Grants submitted as PI	0.62 (1.01)	0.61 (0.99)	0.62 (1.06)
Grants submitted as CI	0.60 (0.91)	0.60 (0.94)	0.59 (0.86)
Conferences participated	0.63 (0.99)	0.63 (1.01)	0.64 (0.96)

Paper N: All=467, Females=288, Males=179; Grants PI N: All=419, Females=254, Males=165; Grants CI N: All=404, Females=242, Males=162; Conferences N: All=423, Females=260, Males=163

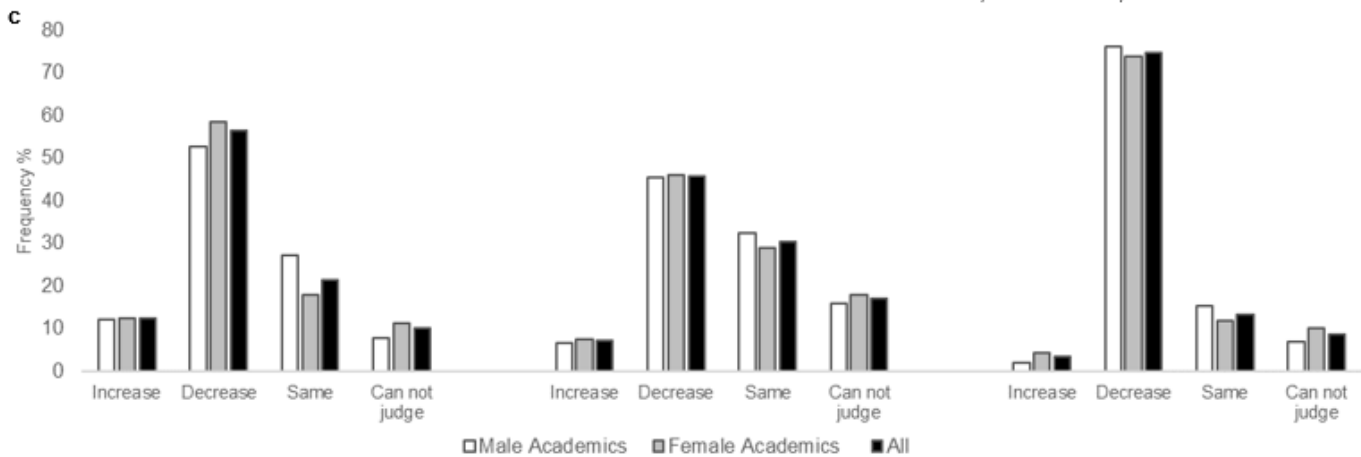


Figure 1

Academic Productivity. **a**, Percentage of research portfolio paused, stopped, and continued as normal during lockdown, by gender, +/- SE of *M*. **b**, Mean and standard deviation for productivity measures during March – October 2020, by gender. **c**, Response frequencies of productivity changes during March – October 2020, by gender.

a

Outcome	df	Before/During COVID main effect	Gender main effect	Interaction effect
% of caregiving within household ^a	1, 412	F=50.17, p<.001, $\eta_p^2=.11$	F=31.36, p<.001, $\eta_p^2=.07$	F=7.19, p=.008, $\eta_p^2=.02$
% of day spent caregiving ^a	1, 370	F=104.33, p<.001, $\eta_p^2=.22$	F=14.59, p<.001, $\eta_p^2=.04$	F=8.20, p=.004, $\eta_p^2=.02$
% of day spent working ^a	1, 370	F=0.02, p=.901, $\eta_p^2=.00$	F=0.05, p=.816, $\eta_p^2=.00$	F=2.01, p=.16, $\eta_p^2=.01$
Teaching & Learning ^a	1, 370	F=84.57, p<.001, $\eta_p^2=.19$	F=3.92, p=.049, $\eta_p^2=.01$	F=0.73, p=.392, $\eta_p^2=.002$
Research & Scholarship ^a	1, 370	F=193.98, p<.001, $\eta_p^2=.34$	F=3.24, p=.073, $\eta_p^2=.009$	F=1.56, p=.212, $\eta_p^2=.004$
Citizenship ^a	1, 370	F=25.67, p<.001, $\eta_p^2=.065$	F=.167, p=.683, $\eta_p^2=.000$	F=.044, p=.835, $\eta_p^2=.000$
COVID admin ^{b,c}	1, 370		F=1.63, p=.202, $\eta_p^2=.004$	

^a2 (M vs F) x 2 (during vs pre-pandemic) mixed ANOVAs

^bOne-way ANOVA

^cFemale N = 229, Male N = 143, except for % of caregiving in household where female N = 256, male N = 158

b

Outcome	Pre-COVID M (SD)			During COVID M (SD)		
	Females	Males	All	Females	Males	All
of caregiving within household	40.20 (32.85)	25.07 (27.10)	34.42 (31.61)	49.35 (36.74)	29.20 (29.33)	41.66 (35.45)
% of day spent caregiving	13.68 (12.81)	9.91 (10.74)	12.23 (12.18)	22.91 (19.80)	15.10 (16.56)	19.91 (18.99)
% of day spent working	56.76 (22.45)	55.45 (22.53)	56.26 (22.46)	54.83 (22.47)	57.08 (21.40)	55.69 (22.06)
Teaching & Learning	39.79 (24.89)	35.86 (20.99)	38.28 (23.51)	50.91 (28.38)	45.08 (24.89)	48.67 (27.21)
Research & Scholarship	36.14 (23.15)	41.32 (22.58)	38.13 (23.04)	24.34 (22.47)	27.20 (22.45)	25.44 (22.47)
Citizenship	14.63 (14.07)	15.01 (12.27)	14.78 (13.39)	11.11 (13.87)	11.76 (12.27)	11.36 (13.27)
COVID admin				8.15 (14.97)	10.31 (17.17)	8.98 (15.86)

Figure 2

Daily lives of academics. **a**, ANOVA results on the estimated percentages of caregiving, work and work duties with significant findings at $p < .05$ in bold. **b**, Daily lives and workday allocation proportion estimates by gender, during and pre-pandemic.

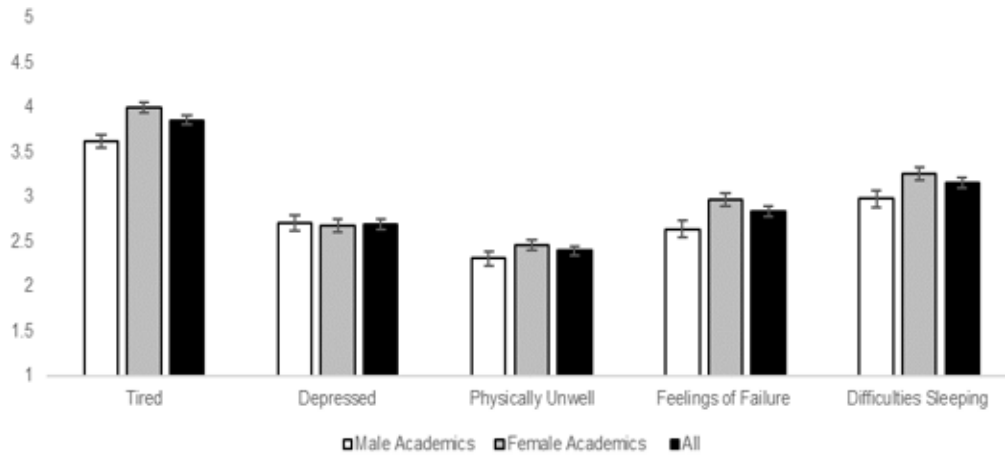
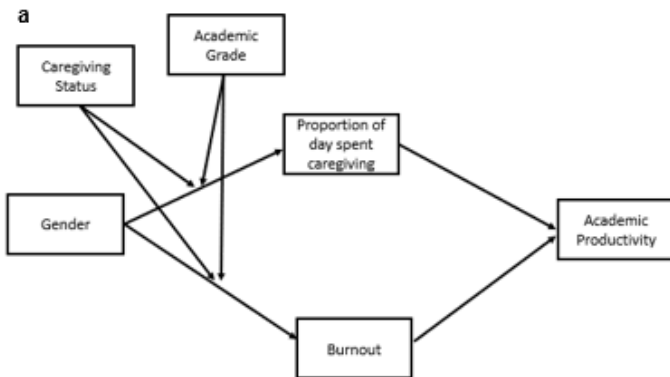


Figure 3

Burnout and wellbeing by gender. +/- SE of M.



b

Predictor variable	Outcome: Proportion of day spent caregiving.		Outcome: Burnout		Outcome: Academic Productivity		Gender -> Caregiving -> Productivity		Gender -> Burnout -> Productivity	
	$R^2=.48, F(7, 351)=47.27, p<.001$		$R^2=.08, F(7, 351)=4.41, p<.001$		$R^2=.20, F(9, 349)=9.54, p<.001$		b	CI	b	CI
	b	CI	b	CI	b	CI	b	CI	b	CI
	Direct effects									
Gender	1.62	[-4.36, 7.60]	-.03	[-.34, .29]	.15	[-.10, .39]				
Caregiving status	23.23**	[18.17, 28.30]	.03	[-.24, .29]	.28*	[.05, .51]				
Academic Grade 1	.72*	[-4.77, 6.21]	-.21	[-.50, .08]	.11	[-.12, .33]				
Academic Grade 2	-3.16	[-9.45, 3.14]	-.61**	[-.94, -.28]	.39*	[.12, .65]				
Proportion of day spent caregiving					-.005*	[-.01, -.00]				
Burnout					-.12*	[-.21, -.04]				
Gender * caregiving status	7.15	[.65, 13.65]	.16	[-.18, .51]	-.16	[-.43, .11]				

Figure 4

Moderated Mediation Model. a, A moderated mediation model of academic productivity. **b,** Results for the moderated mediation model of academic productivity.