



Academic clinician frontline-worker wellbeing and resilience during the COVID-19 pandemic experience: Were there gender differences?

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Abbreviations: ACFW, "Academic Clinician Frontline-Workers" are clinician faculty working at the frontline within an academic healthcare system who provided direct care. Respondents self-identified as frontline worker for COVID-19; WFC, Work to Family Conflict scores of the validated Work-Family/Family-Work Conflict Scale (WFC/FWC²³, a 10-item survey measuring the two-way model of work-family conflict. A sample question from the scale is provided here; FWC, Family to Work Conflict scores of the validated Work-Family/Family-Work Conflict Scale (WFC/FWC²⁵, a 10-item survey measuring the two-way model of work-family conflict. A sample question from the scale is provided here.

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ABSTRACT

Prior research suggests COVID-19 has amplified stress on Academic Clinician Frontline-Workers (ACFW). The aim of this paper is: (1) to better understand the experiences of ACFW during the COVID-19 pandemic including their mental-emotional wellbeing, academic productivity, clinical experiences, and (2) to examine any gender differences. A cross-sectional survey was administered to University of Minnesota/M Health Fairview systems' faculty February-June 2021. Of the 291 respondents, 156 were clinicians, with 91 (58 %) identifying as Frontline-Workers (ACFW). Faculty wellbeing was assessed using validated measures in addition to measures of productivity and sociodemographics. For example, ACFW reported a higher Work-Family Conflict (WFC) scores compared to non-ACFW (26.5 vs. 24.1, $p = 0.057$) but did not report higher Family-Work Conflict (FWC) scores (17.7 vs. 16.3, $p = 0.302$). Gender sub-analyses, revealed that women ACFW compared to men ACFW reported higher WFC scores (27.7 vs. 24.1, $p = 0.021$) and FWC (19.3 vs. 14.3, $p = 0.004$). Academically, ACFW reported submitting fewer grants and anticipated delays in promotion and tenure due to the COVID-19 ($p = 0.035$). Results suggest COVID-19 has exacerbated ACFW stress and gender inequities. Reports of anticipated delay in promotion for ACFW may pose a challenge for the long-term academic success of ACFW, especially women ACFW. In addition, women may experience higher FWC and WFC as compared to men. Schools of academic medicine should consider re-evaluating promotion/tenure processes and creating resources to support women ACFW as well as ACFW caregivers.

1. Introduction

The COVID-19 pandemic created psychological and physical stress on healthcare workers (Salari et al., 2023 Jan; Umbetkulova et al., 2023 May; Koontalay et al., 2021 Oct), but this experience likely varied depending on responsibilities and exposure. During the pandemic, one third of healthcare workers experienced symptoms of anxiety, with just under a third reporting depressive symptoms, and a quarter reporting sleep problems. (Balai et al., 2022) Amongst health workers, the emotional experience of COVID-19 pandemic may have been worse for frontline-workers. Factors such as gender, occupational pressure, and low levels of support from administration exacerbated the psychological impact of COVID-19 on frontline healthcare workers. (Froessl and Abdeen, 2021) Clinicians in Academic medicine also faced unique additional challenges including the expectation to contribute to the missions of research and scholarship as well as education and service while also attending to increased workloads due to COVID-19. This study focuses on Academic Clinical Frontline-Workers (ACFW) defined as clinician faculty working at the frontline within an academic healthcare system.

Similar to other healthcare workers, the pandemic imposed challenges, including shifts in work-life balance and changing expectations for ACFW, (Schieman et al., 2021; Del Boca et al., 2020; Chung et al., July 29, 2020.) which contributed to psychological distress and burnout. (Frew et al., 2020; Mantri et al., 2021; Sumner and Kinsella, 2020) Even prior to the pandemic, women and men clinicians differed in domestic responsibilities, with women more commonly doing caregiving tasks and household chores. (Mache et al., 2015; Cerrato and Cifre, 2018) To study these domains specifically, we employed the Work-Family Conflict Scale developed and validated by Netemeyer, Boles and McMurrian (1996) which assesses the bi-directional interference of paid work and home/family life. This measure enables us to differentiate and explore how these two domains interact among academic clinicians. Balancing home and work integration was especially challenging during the pandemic as childcare facilities and schools closed. (Staniscuaski et al., 2021; Woitowich et al., 2021) The closure of childcare facilities and

schools placed an added burden on women clinicians, primarily due to increased caregiving responsibilities, which subsequently led to reduced academic productivity. (Staniscuaski et al., 2021; Woitowich et al., 2021) Among clinicians, those with caregiver responsibilities experienced a significant impact on their work and had higher odds of reporting burnout. This effect was particularly pronounced among younger clinicians who had caregiving obligations, resulting in a heightened likelihood of experiencing burnout. Additionally, these clinicians faced concerns about the potential exposure of their families to health risks and the challenge of managing a "second shift" of caregiving and household responsibilities while working as female clinicians. (Dillon et al., 2022).

This study aimed to understand the experiences of ACFW during the COVID-19 pandemic at a large academic institution related to resiliency, emotional wellbeing, conflicts between family and work, and academic productivity. There is limited data in the literature on the associations between gender, rank, and caregiver role and work-life balance, productivity, wellbeing, or resiliency of academic clinician faculty. Thus, the aims of this study were: (1) to investigate academic ACFW experience of well-being and academic productivity, and (2) to evaluate the impact of gender on academic ACFW well-being, resiliency, and academic productivity during the COVID-19 pandemic. We hypothesize that ACFW and in particular women ACFW will report lower scores on wellbeing, resilience, and academic productivity. Results from this study will identify disparities and opportunities for supporting ACFW as a result of the COVID-19 pandemic.

2. Methods

2.1. Sample

We conducted a cross sectional mixed-methods study aimed at examining faculty experiences during the COVID-19 pandemic. (Berge et al., in press) An electronic survey was developed using Qualtrics and administered to faculty from the UMN Schools of Medicine ($n = 3,000$), Public Health ($n = 130$), and Dentistry ($n = 120$) between February-June 2021. There were 291 faculty who completed the survey (e.g. 9 % of the entire eligible population). The majority were from the Medical School ($n = 233$) with seven faculty holding dual-appointments across

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multiple schools (e.g. Medical School and School of Public Health). The current study includes the subsample of clinician only faculty ($n = 156$) and uses their quantitative data only.

2.2. Survey development

The survey included 81 questions in total, with the majority being quantitative questions and some qualitative write-in questions ($n = 7$). On average the survey took 15–20 min to complete using branching logic to reduce survey participant fatigue. It included both validated and non-validated scales. The survey was designed by a diverse group of Center for Women in Medicine and Science (CWIMS) faculty ($n = 15$). This faculty group was interdisciplinary (e.g. PhD and MD faculty, basic and clinical departments), represented diverse racial and ethnic backgrounds (i.e., White and Black, Indigenous, and People of Color (BIPOC)), and academic career stages (i.e. Assistant Professor, Associate Professor, Full Professor) within the UMN Medical School. We met regularly over the months of May 2020–December 2020 to design the survey contents using research best practices. (Draugalis et al., 2008; American Association for Public Opinion Research. Best Practices for Survey Research - AAPOR. Accessed July 25, 2022) We also engaged multiple stakeholder groups (e.g., Office of Faculty Affairs; Office of Diversity, Equity and Inclusion; Well-being Working Group; Center for Women in Medicine and Science) who gave feedback during the survey development process. The University of Minnesota Institutional Review Board determined this study as non human subjects research (STUDY00010358: COVID-19 Health Sciences Faculty Survey). However, given survey research best practice was used in the development of the survey, (Draugalis et al., 2008; American Association for Public Opinion Research. Best Practices for Survey Research - AAPOR. Accessed July 25, 2022)consenting language was included.

2.3. Procedures

Over the months of February–June 2021, faculty participants were recruited via email sent to their University of Minnesota email account. Recruitment was multitiered and included emails sent directly to faculty from departments/centers and links to participate in the survey administered in monthly newsletters. Data was collected through the Qualtrics (Qualtrics. Version February, 2021) survey software platform administered using the CWIMS account. Upon completion of the survey, participants received consent information and information about being placed into a random drawing for 50 prepaid \$25 gift cards in an email.

2.4. Measures

All exposure and outcome measures used in the study are described in the [Supplemental Materials Table](#).

2.5. Statistical Analysis

Respondent characteristics were summarized using counts and rates for categorical measures and means and standard deviations for numerical measures. Academic rank was considered to be an important potential confounder in analyses of ACFW status and gender, so these analyses were performed both without and with adjustment for rank. Categorical measures were compared between groups (ACFW status, gender, academic rank) using chi-square tests for association, and with multinomial regression models adjusting for academic rank. Numerical measures were compared between groups using linear models with and without adjustment for academic rank. The outcomes of WFC, FWC, and BRS were each compared by frontline status, caregiver status, and gender using linear models with main effects terms for frontline, caregiver, and gender and all two- and three-way interactions; after interaction terms were tested and found not significant they were dropped from the models and the main effects model results were reported using

estimated marginal means with 95 % confidence intervals. Each outcome measure was analyzed using a multiple linear regression model which included all identity factors, such that the impact of each factor is adjusted for the effects of the other two factors. Analyses were conducted using R version 4.1.1.

3. Results

A total of 291 academic faculty participated in the study. The analytic sample includes 156 academic clinical faculty. Among the 156 clinicians, 91 (58 %) are defined as ACFW by their department and/or self-identified, and 65 (42 %) as non-ACFW. Of the 91 ACFW, 14 were only self-identified as ACFW, 15 were identified by their department as ACFW, and 62 participants were identified by both their department and themselves as ACFW. Within the ACFW group, 57 (63 %) identify as women, 31 (34 %) identify as men, and 3 (3 %) identify as nonbinary/missing/preferred not to say, 0 (0 %) self described their gender. The majority within the entire sample of academic clinicians were faculty at the rank of Assistant Professor ($N = 83$) with 54 (59 %) of ACFW and 29 (45 %) of non-ACFW. Participant demographic and academic work characteristics are shown in [Table 1](#).

3.1. Associations Between Being ACFW and Mental-Emotional Well-Being

There were no significant associations between being a ACFW and non-ACFW worker on validated measures including Brief Resilience Scale (BRS) (21.6 vs. 21.0, $p = 0.479$), and the Patient Health Questionnaire-4 (PHQ-4) for anxiety symptoms (3.53 vs. 3.51, $p = 0.924$) and depressive symptoms (2.80 vs. 3.03, $p = 0.279$) ([Table 1](#)).

In gender sub-analyses, women ACFW reported lower resilience than men ACFW on the BRS (20.6 vs. 23.3, $p = 0.012$) ([Table 2](#)). Other validated measures including the work autonomy scale, PHQ4 anxiety and depression, and sleep did not differ by gender among ACFW. However, women ACFW tended to report higher scores of stress (4.4 vs. 3.9, $p = 0.065$) and anxiety (3.5 vs. 2.9, $p = 0.072$) than men ACFW during the COVID-19 pandemic.

3.2. Associations Between Being ACFW and WFC/FWC

ACFW reported a higher Work-Family Conflict (WFC) score compared to non-ACFW (26.5 vs. 24.1, $p = 0.057$) but did not report higher Family-Work Conflict Scale (FWC) scores (17.7 vs. 16.3, $p = 0.302$). Gender sub-analyses, revealed that women ACFW compared to men ACFW reported higher WFC scores (27.7 vs. 24.1, $p = 0.021$) and FWC (19.3 vs. 14.3, $p = 0.004$), which were statistically significant. We identified that being a junior rank faculty was associated with higher WFC (assistant professor, 26.5; associate professor, 25.2; full, 23.3; $p = 0.098$) and higher FWC (18.9; 18.2; 12.0; $p = 0.001$) ([Table 3](#)).

[Fig. 1](#) presents a summary of the main effects of multiple identities (caregiver status, ACFW, and gender) across validated well-being measures (WFC, FWC and BRS). Results are presented as means with 95 % confidence intervals. The mean WFC score was higher in women than men ($p = 0.033$) and higher in caregivers than non-caregivers ($p = 0.029$), and tended to be higher in ACFW than non-ACFW ($p = 0.094$) ([Fig. 1A](#)). The mean FWC score was higher in caregivers ($p < 0.0001$) and tended to be higher in women ($p = 0.055$) ([Fig. 1B](#)). The mean BRS score was lower in women than men ($p = 0.031$) ([Fig. 1C](#)).

3.3. Associations Between Being ACFW and Academic Productivity

Regarding self-reported academic productivity, ACFW ($n = 32$) reported submitting fewer grant proposals compared to non-ACFW ($n = 16$) ($p = 0.031$), even after adjusting for academic rank ($p = 0.012$). ACFW were more likely to report an anticipated delay to promotion and tenure due to the COVID-19 pandemic after adjusting for academic rank

Table 1
Descriptive and Multiple Linear Regression Analysis of Sociodemographic Characteristics, Wellbeing, Academic Outputs and Clinical Experiences by Academic Clinical Frontline-Workers Status.

Topic	Category	Level	Not Frontline	Frontline	P-value, unadjusted	P-value, adjusted for rank
Sociodemographic Factors	Number of Respondents		65	91		
	Gender (%)	missing	0 (0.0)	1 (1.1)	0.274	0.778
		Man	22 (33.8)	31 (34.1)		
		non-binary	0 (0.0)	1 (1.1)	0.122	0.166
		Prefer not to say	0 (0.0)	1 (1.1)		
		self-describe	3 (4.6)	0 (0.0)	0.098	0.157
		Woman	40 (61.5)	57 (62.6)		
	Race, Underrepresented in Medicine (%)	I prefer not to answer	6 (9.2)	2 (2.2)	0.208	NA
		non-URM	55 (84.6)	85 (93.4)		
	Track (%)	URM	4 (6.2)	4 (4.4)	0.336	0.388
		missing	0 (0.0)	1 (1.1)		
		Academic Track (Clinical)	24 (36.9)	20 (22.0)	0.478	0.512
		Academic Track (Research)	7 (10.8)	16 (17.6)		
		Academic Track (Teaching)	4 (6.2)	16 (17.6)	0.237	0.278
		Clinician Track	12 (18.5)	20 (22.0)		
		Other	3 (4.6)	5 (5.5)	0.479	0.342
		Tenure Track	15 (23.1)	13 (14.3)		
	Rank (%)	Assistant Professor	29 (44.6)	54 (59.3)	0.705	0.951
		Associate Professor	18 (27.7)	16 (17.6)		
		Full Professor	18 (27.7)	20 (22.0)	0.924	0.847
Other		0 (0.0)	1 (1.1)			
Caregiver (%)	No	37 (56.9)	43 (47.8)	0.279	0.202	
	Yes	28 (43.1)	47 (52.2)			
Mental-Emotional Wellbeing	Sleep, pre-pandemic, hours per night (%)	<7	17 (26.2)	18 (20.0)	0.336	0.236
		≥7	48 (73.8)	72 (80.0)		
	Sleep, pandemic, hours per night (%)	<7	25 (38.5)	25 (28.1)	0.344	0.268
		≥7	40 (61.5)	64 (71.9)		
	BRS total (mean (SD))		21.05 (3.91)	21.56 (4.70)	0.143	0.220
	WAS total (mean (SD))		33.74 (10.95)	33.08 (10.52)	0.611	0.391
	PHQ4 Anxiety total (mean (SD))		3.51 (1.61)	3.53 (1.69)	0.969	0.811
	PHQ4 Depression total (mean (SD))		3.03 (1.45)	2.80 (1.19)	0.230	0.241
	BRCS total (mean (SD))		14.98 (2.43)	15.35 (2.22)	0.486	0.734
	Stressed (mean (SD))		3.97 (1.31)	4.27 (1.20)	0.378	0.196
	Overwhelmed (mean (SD))		3.78 (1.37)	3.66 (1.52)	0.509	0.270
	Anxious (mean (SD))		3.34 (1.47)	3.35 (1.58)	0.302	0.548
	Depressed (mean (SD))		2.45 (1.39)	2.24 (1.33)	0.057	0.112
	Happy (mean (SD))		3.08 (1.20)	3.30 (1.11)		
	Social_Isolation (mean (SD))		3.68 (1.43)	3.84 (1.48)		
	Uncertain_Finance (mean (SD))		2.37 (1.43)	2.17 (1.36)		
	Uncertain_Job (mean (SD))		1.94 (1.14)	1.81 (1.27)		
	FWC total (mean (SD))		16.32 (8.79)	17.72 (7.92)		
	WFC total (mean (SD))		24.14 (8.31)	26.51 (7.07)		
Academic Outputs	Workload ("I am responsible for"): Research (%)	less work	3 (5.0)	10 (11.8)	0.324	0.307
		the same amount of work	35 (58.3)	43 (50.6)		
		more work	20 (33.3)	25 (29.4)		
		Not applicable	2 (3.3)	7 (8.2)		
	Workload ("I am responsible for"): Teaching (%)	less work	7 (11.3)	10 (12.0)	0.822	0.869
		the same amount of work	37 (59.7)	56 (67.5)		
		more work	13 (21.0)	15 (18.1)		
		Not applicable	5 (8.1)	2 (2.4)		
	Workload ("I am responsible for"): Service (%)	less work	2 (3.4)	3 (3.7)	0.831	0.845
		the same amount of work	21 (36.2)	38 (46.3)		
		more work	23 (39.7)	33 (40.2)		
		Not applicable	12 (20.7)	8 (9.8)		
Workload ("I am responsible for"): Clinical (%)	less work	6 (9.7)	7 (7.8)	0.059	0.054	
	the same amount of work	35 (56.5)	35 (38.9)			

(continued on next page)

Table 1 (continued)

Topic	Category	Level	Not Frontline	Frontline	P-value, unadjusted	P-value, adjusted for rank
		more work	21 (33.9)	48 (53.3)		
		Not applicable	0 (0.0)	0 (0.0)		
	Productivity ("I complete"): Research (%)	less work	34 (55.7)	48 (56.5)	0.550	0.540
		the same amount of work	15 (24.6)	14 (16.5)		
		more work	10 (16.4)	16 (18.8)		
	Productivity ("I complete"): Teaching (%)	Not applicable	2 (3.3)	7 (8.2)		
		less work	15 (24.2)	19 (23.5)	0.621	0.564
		the same amount of work	33 (53.2)	43 (53.1)		
		more work	9 (14.5)	18 (22.2)		
	Productivity ("I complete"): Service (%)	Not applicable	5 (8.1)	1 (1.2)		
		less work	3 (5.2)	11 (13.8)	0.350	0.409
		the same amount of work	25 (43.1)	34 (42.5)		
		more work	17 (29.3)	27 (33.8)		
	Productivity ("I complete"): Clinical (%)	Not applicable	13 (22.4)	8 (10.0)		
		less work	12 (19.0)	8 (8.9)	0.071	0.110
		the same amount of work	30 (47.6)	38 (42.2)		
		more work	21 (33.3)	44 (48.9)		
	Expected Delay in Promotion and Tenure (%)	Not applicable	0 (0.0)	0 (0.0)		
		No	27 (41.5)	31 (34.1)	0.039	0.014
		Maybe	17 (26.2)	16 (17.6)		
		Yes	9 (13.8)	28 (30.8)		
	Manuscripts (%)	Not applicable	12 (18.5)	16 (17.6)		
		fewer	23 (39.7)	24 (36.9)	0.945	0.922
		same	21 (36.2)	24 (36.9)		
		more	14 (24.1)	17 (26.2)		
	Grants (%)	fewer	16 (36.4)	32 (60.4)	0.031	0.012
		same	28 (63.6)	21 (39.6)		
		more	0 (0.0)	0 (0.0)		
Clinical Experience	From your perspective, during the COVID-19 pandemic, how much would you agree with the following:	I feel that a supportive work culture is promoted for clinical responsibilities (mean (SD))	3.25 (1.08)	3.36 (1.20)	0.546	0.580
		Access to appropriate PPE has been limited (mean (SD))	2.98 (1.09)	3.42 (1.35)	0.036	0.055
		I (my family and I) have been exposed to COVID-19 due to my clinical responsibilities (mean (SD))	2.45 (1.17)	3.07 (1.40)	0.005	0.011

(31 % vs. 14 %, $p = 0.014$). Though statistically not significant, among ACFW 39 % of women anticipated a delay in promotion compared to 19 % of men. Within the specific work domain, women ACFW reported increased service productivity compared to men (44 % vs. 15 %, $p = 0.049$). Among academic clinical faculty there was no statistical difference in perception of change in workload and productivity during COVID-19 (2020–2021) relative to pre-COVID-19 (2019) in domains of research, teaching, and service when comparing ACFW to non-ACFW (Table 1).

3.4. Association Between Being ACFW and Clinical Experience

During the COVID-19 pandemic (2020–2021), women ACFW compared to men ACFW were more likely to agree that access to appropriate PPE was limited (3.7 vs. 2.9, $p = 0.007$), which was statistically significant. Perception of clinical workload was higher among ACFW at 53 % ($N = 48$, $p = 0.059$) compared to non-ACFW at 34 % ($N = 21$) during COVID-19 compared to pre-COVID-19.

4. Discussion

In this study we identified important ACFW experiences during COVID-19 at a major Midwest academic medical institution across three broad domains: academic productivity, work-family and family-work conflict, and well-being. Overall, our study findings showed ACFW compared to non-ACFW reported increased clinical workload, less academic productivity, and that gender and caregiver status were important confounding factors that influenced the experience of ACFW with regard to WFC/FWC and emotional well-being. Our results support other findings that ACFW served in an unprecedented capacity during the

COVID-19 pandemic with potential ramifications to their wellbeing, home and work life. (Schieman et al., 2021; Firew et al., 2020; Mantri et al., 2021; Sumner and Kinsella, 2020).

Specifically, ACFW reported a negative impact on academic productivity due to the COVID-19 pandemic, which included submitting fewer grants with anticipated delay to promotion and tenure compared to non-ACFW after adjusting for academic rank. Delay in academic promotion posed by the pandemic has been recognized to impact specific groups such as early/junior faculty, but little attention has been paid to frontline faculty. (Carr et al., 2021 Mar; Arora et al., 2021) Arora and colleagues suggested in their paper that faculty who have contributed in novel ways during the COVID-19 pandemic to help support their personal and academic communities may not be given credit for these efforts by their promotion committees. (Carr et al., 2021 Mar) Recognizing and valuing these efforts is one way to counterbalance the negative impacts on productivity and career progression during COVID-19.

Next, our findings identified gender differences in ACFW experiences related to service time and clinical productivity. Women ACFW reported increased service productivity during the pandemic compared to men ACFW. Others have reported similar findings and in particular highlight the unbalanced burden of domestic and childcare responsibilities. (Moors et al., 2022; Harrington and Reese-Melancon, 2022) Specifically, Madsen and colleagues highlight the disproportionate pressure placed on women frontline clinicians and caregivers, pertaining to childcare responsibilities, domestic tasks, protecting their families from COVID-19 infection, and shortage of PPE. (Madsen et al., 2020) These additional pressures result in decreased academic productivity; in particular, women in academic medicine have decreased first author submissions. (Madsen et al., 2020) Additionally, Krukowski and colleagues found that

Table 2
 Descriptive and Multiple Linear Regression Analysis of Sociodemographic Characteristics, Wellbeing, Academic Outputs and Clinical Experiences by Gender and Academic Clinical Frontline-Workers Status.

Topic	Category	Level	Not Frontline		Frontline		P-value, Overall		P-value, Frontline Woman vs. Man	
			Woman	Man	Woman	Man	Unadj.	Adj. for Rank	Unadj.	Adj. for Rank
Sociodemographic Factors	Number of Respondents Rank (%)	Assistant Professor	40	22	57	31	0.002	NA	0.189	NA
			21 (52.5)	5 (22.7)	37 (64.9)	17 (54.8)				
		Associate Professor	13 (32.5)	5 (22.7)	11 (19.3)	4 (12.9)				
		Full Professor	6 (15.0)	12 (54.5)	9 (15.8)	10 (32.3)				
Mental-Emotional Wellbeing	Sleep, prepandemic, hours per night (%)	<7	9 (22.5)	7 (31.8)	12 (21.1)	5 (16.1)	0.595	0.643	0.782	0.675
		≥7	31 (77.5)	15 (68.2)	45 (78.9)	26 (83.9)				
	Sleep, pandemic, hours per night (%)	<7	14 (35.0)	9 (40.9)	15 (26.3)	10 (33.3)	0.609	0.795	0.661	0.522
		≥7	26 (65.0)	13 (59.1)	42 (73.7)	20 (66.7)				
	BRS total (mean (SD))		20.59 (4.27)	22.05 (3.18)	20.63 (4.49)	23.26 (4.73)	0.028	0.064	0.012	0.024
	WAS total (mean (SD))		33.70 (11.07)	34.05 (11.50)	33.44 (9.95)	33.00 (11.60)	0.987	0.977	0.853	0.625
	PHQ4 Anxiety total (mean (SD))		3.55 (1.69)	3.27 (1.39)	3.58 (1.64)	3.32 (1.66)	0.817	0.828	0.487	0.500
	PHQ4 Depression total (mean (SD))		2.98 (1.48)	3.05 (1.50)	2.84 (1.08)	2.65 (1.28)	0.657	0.677	0.447	0.590
	BRCS total (mean (SD))		14.90 (2.55)	15.27 (2.37)	15.32 (2.18)	15.47 (2.21)	0.751	0.663	0.761	0.923
	Stressed (mean (SD))		4.18 (1.34)	3.55 (1.26)	4.44 (1.21)	3.93 (1.17)	0.031	0.061	0.065	0.086
	Overwhelmed (mean (SD))		4.05 (1.41)	3.27 (1.24)	3.84 (1.53)	3.33 (1.52)	0.090	0.263	0.143	0.295
	Anxious (mean (SD))		3.58 (1.62)	2.91 (1.19)	3.54 (1.62)	2.90 (1.47)	0.109	0.260	0.072	0.124
	Depressed (mean (SD))		2.40 (1.37)	2.50 (1.54)	2.28 (1.37)	2.10 (1.30)	0.729	0.643	0.554	0.733
	Happy (mean (SD))		3.20 (1.20)	2.95 (1.17)	3.37 (0.98)	3.17 (1.37)	0.536	0.544	0.428	0.446
	Social Isolation (mean (SD))		3.65 (1.53)	3.50 (1.19)	3.89 (1.45)	3.63 (1.52)	0.675	0.879	0.433	0.667
	Uncertain_Finance (mean (SD))		2.42 (1.47)	2.27 (1.49)	2.28 (1.37)	1.83 (1.15)	0.337	0.369	0.131	0.224
	Uncertain_Job (mean (SD))		1.95 (1.18)	1.82 (1.10)	1.80 (1.21)	1.67 (1.18)	0.801	0.799	0.616	0.647
	FWC total (mean (SD))		18.23 (9.48)	13.36 (7.00)	19.32 (7.53)	14.29 (7.61)	0.004	0.082	0.004	0.015
	WFC total (mean (SD))		25.20 (7.95)	22.05 (9.25)	27.70 (6.21)	24.06 (8.10)	0.017	0.063	0.021	0.029
	Academic Outputs	Workload ("I am responsible for"): Research (%)	less work	3 (7.5)	0 (0.0)	4 (7.1)	6 (22.2)	0.155	0.135	0.071
the same amount of work			23 (57.5)	11 (64.7)	26 (46.4)	15 (55.6)				
more work			12 (30.0)	6 (35.3)	20 (35.7)	5 (18.5)				
Not applicable			2 (5.0)	0 (0.0)	6 (10.7)	1 (3.7)				
Workload ("I am responsible for"): Teaching (%)		less work	3 (7.5)	3 (15.8)	6 (11.1)	3 (11.1)	0.805	0.955	0.847	0.985
		the same amount of work	23 (57.5)	13 (68.4)	36 (66.7)	19 (70.4)				
		more work	10 (25.0)	2 (10.5)	11 (20.4)	4 (14.8)				
		Not applicable	4 (10.0)	1 (5.3)	1 (1.9)	1 (3.7)				
Workload ("I am responsible for"): Service (%)		less work	2 (5.1)	0 (0.0)	1 (1.9)	2 (7.4)	0.489	0.503	0.122	0.195
		the same amount of work	13 (33.3)	6 (37.5)	22 (41.5)	14 (51.9)				
		more work	15 (38.5)	7 (43.8)	26 (49.1)	7 (25.9)				
		Not applicable	9 (23.1)	3 (18.8)	4 (7.5)	4 (14.8)				
Workload ("I am responsible for"): Clinical (%)	less work	2 (5.0)	3 (15.8)	5 (8.8)	2 (6.5)	0.046	0.041	0.246	0.418	
	the same amount of work	22 (55.0)	13 (68.4)	19 (33.3)	16 (51.6)					
	more work	16 (40.0)	3 (15.8)	33 (57.9)	13 (41.9)					
	Not applicable	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)					

(continued on next page)

Table 2 (continued)

Topic	Category	Level	Not Frontline		Frontline		P-value, Overall		P-value, Frontline Woman vs. Man	
			Woman	Man	Woman	Man	Unadj.	Adj. for Rank	Unadj.	Adj. for Rank
Clinical Experience	Productivity ("I complete"): Research (%)	less work	24 (60.0)	8 (44.4)	30 (53.6)	17 (63.0)	0.351	0.243	0.491	0.490
		the same amount of work	10 (25.0)	4 (22.2)	7 (12.5)	6 (22.2)				
		more work	4 (10.0)	6 (33.3)	12 (21.4)	4 (14.8)				
	Productivity ("I complete"): Teaching (%)	Not applicable	2 (5.0)	0 (0.0)	7 (12.5)	0 (0.0)	0.578	0.566	0.827	0.627
		less work	7 (17.5)	7 (35.0)	12 (23.1)	5 (18.5)				
		the same amount of work	21 (52.5)	11 (55.0)	29 (55.8)	14 (51.9)				
	Productivity ("I complete"): Service (%)	more work	8 (20.0)	1 (5.0)	11 (21.2)	7 (25.9)	0.164	0.121	0.049	0.073
		Not applicable	4 (10.0)	1 (5.0)	0 (0.0)	1 (3.7)				
		less work	3 (7.7)	0 (0.0)	5 (9.6)	5 (19.2)				
	Productivity ("I complete"): Clinical (%)	the same amount of work	17 (43.6)	5 (31.2)	20 (38.5)	13 (50.0)	0.038	0.113	0.609	0.638
		more work	11 (28.2)	6 (37.5)	23 (44.2)	4 (15.4)				
		Not applicable	8 (20.5)	5 (31.2)	4 (7.7)	4 (15.4)				
	Expected Delay in Promotion and Tenure (%)	less work	5 (12.5)	7 (35.0)	4 (7.0)	4 (12.9)	0.010	0.041	0.425	0.517
		the same amount of work	19 (47.5)	10 (50.0)	26 (45.6)	12 (38.7)				
		more work	16 (40.0)	3 (15.0)	27 (47.4)	15 (48.4)				
Not applicable		0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)					
Manuscripts (%)	No	14 (35.0)	13 (59.1)	20 (35.1)	9 (29.0)	0.451	0.296	0.364	0.353	
	Maybe	14 (35.0)	2 (9.1)	9 (15.8)	6 (19.4)					
	Yes	6 (15.0)	2 (9.1)	22 (38.6)	6 (19.4)					
Grants (%)	Not applicable	6 (15.0)	5 (22.7)	6 (10.5)	10 (32.3)	0.026	0.011	1.000	0.822	
	fewer	17 (47.2)	4 (21.1)	15 (37.5)	8 (36.4)					
	same	11 (30.6)	9 (47.4)	12 (30.0)	10 (45.5)					
From your perspective, during the COVID-19 pandemic, how much would you agree with the following:	more	8 (22.2)	6 (31.6)	13 (32.5)	4 (18.2)	0.549	0.695	0.269	0.324	
	fewer	14 (46.7)	2 (15.4)	20 (62.5)	11 (61.1)					
	same	16 (53.3)	11 (84.6)	12 (37.5)	7 (38.9)					
	Access to appropriate PPE has been limited (mean (SD))	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)					
	3.17 (1.13)	3.36 (1.05)	3.26 (1.25)	3.57 (1.14)						
I (my family and I) have been exposed to COVID-19 due to my clinical responsibilities (mean (SD))	2.89 (1.20)	3.05 (0.92)	3.67 (1.20)	2.87 (1.45)	0.005	0.007	0.007	0.011		
	2.40 (1.08)	2.33 (1.28)	3.11 (1.40)	2.90 (1.42)	0.025	0.046	0.521	0.525		

women faculty in science, technology, engineering, mathematics and medicine with children younger than age 5 completed significantly fewer peer review assignments, attended fewer funding panels, and had fewer first author publications during COVID-19 compared to prior to the pandemic. (Krukowski et al., 2021)The pathway to promotion for faculty with multiple identities inclusive of ACFW, women, and caregiver status needs to be further explored and programs created to support their academic success.

Additionally, women ACFW experienced disproportionate challenges in well-being measures compared to men ACFW. Specifically, women ACFW reported higher WFC, FWC, and lower BRS scores compared to men ACFW. These outcomes highlight the differential experience of gender and frontline worker status on well-being during

the COVID-19 pandemic within an academic healthcare setting. These findings are consistent with other studies showing women ACFW during COVID-19 pandemic reported high work and home stress and this impacts early and mid-career providers more negatively. (Kotini-Shah et al., 2022)Additionally, women have been found to have experienced more stress than men with scholarship productivity, teaching, advising, and clinical responsibilities. (Carr et al., 2021 Mar; Arora et al., 2021; Moors et al., 2022; Harrington and Reese-Melancon, 2022; Madsen et al., 2020; Krukowski et al., 2021; Kotini-Shah et al., 2022; Misra et al., 2012; Gabster et al., 2020; Halley et al., 2021)This stress may have been exacerbated in assistant and associate professor women with young children, who experienced high work-home stress, and disturbance of self-care. (Kotini-Shah et al., 2022; Misra et al., 2012; Gabster et al.,

Table 3
Descriptive and Association Analysis of Wellbeing Metrics Among Academic Clinical Frontline-Workers Status by Academic Rank.

Category	level	Assistant Professor	Associate Professor	Full Professor	P-value
Number of Respondents		83	34	38	
Sleep, pre-pandemic, hours per night (%)	<7 ≥7	16 (19.3) 67 (80.7)	12 (35.3) 22 (64.7)	7 (18.9) 30 (81.1)	0.140
Sleep, pandemic, hours per night (%)	<7 ≥7	23 (27.7) 60 (72.3)	13 (39.4) 20 (60.6)	14 (37.8) 23 (62.2)	0.358
BRS total (mean (SD))		20.70 (3.87)	21.24 (4.78)	22.78 (4.84)	0.054
FWC total (mean (SD))		18.86 (8.52)	18.15 (8.05)	12.00 (5.49)	<0.001
WFC total (mean (SD))		26.54 (6.13)	25.18 (9.33)	23.30 (8.78)	0.098
WAS total (mean (SD))		31.78 (9.95)	35.44 (9.99)	35.41 (12.21)	0.106
PHQ4 Anxiety total (mean (SD))		3.57 (1.52)	3.38 (1.74)	3.43 (1.74)	0.828
PHQ4 Depression total (mean (SD))		2.88 (1.30)	2.91 (1.24)	2.84 (1.32)	0.971
BRCS total (mean (SD))		14.84 (2.09)	15.21 (2.55)	15.89 (2.45)	0.070

2020).

Limitations These study findings need to be interpreted with consideration of limitations inherent to survey study design, such as including some single item measures and responding in socially desirable ways. In addition, we acknowledge that our survey sample was small and our response rate was 9 % of the total eligible population. The survey was deployed when the COVID-19 pandemic was at its peak, health care resources were limited, and emotional exhaustion was high. The results represent a limited sample at one institution and may not be representative of all ACFW. In addition, because this is a self-report measure there may have been social desirability bias and/or responder bias. Specifically, responder bias may have occurred because ACFW with the highest burnout/stress levels may not have completed the survey due to the extra burden.

We also recognize that the definition of ACFW was defined by “personal perception of being a front-line worker and departmental designation.” Some clinical faculty temporarily moved into ACFW status

in response to the urgent shortage in workforce during COVID-19 pandemic and this may not fully reflect the longitudinal experience of all ACFW. In addition, the anticipated delay to promotion was self-reported and lacks secondary measure of true impact on promotion and tenure timeline. Within the survey we sought to measure multiple identities including gender but lacked adequate diversity of gender representation due to limited numbers, similarly the representation of other identities such as race/physical ability are not adequately addressed in this survey sample.

In conclusion, our study findings show that during the COVID-19 pandemic, ACFW reported impacts across several domains, many of which were also related to delays in progression along their intended academic trajectory. For instance, delays in promotion and tenure and/or decreases in productivity (e.g. fewer grant submissions) were noted. Although this study focuses on self-reports of change in productivity, future work could examine quantitative rates (e.g. # grant awards, publications).

Notably, women frontline workers faced heightened challenges in balancing the demands of their work and family roles, leading to increased conflict and diminished self-reports of resilience, ultimately affecting their overall well-being. Furthermore, women ACFW reported a greater clinical burden, including heavier clinical workloads, and limited access to personal protective equipment (PPE). These challenges were paralleled by higher levels of both family-work conflict (FWC) and work-family conflict (WFC) measures. Future work should evaluate factors outside the work domain (e.g., work/family and family/work conflict) that may disrupt or support the academic success of women faculty who work as frontline workers. Beyond institutional policies such as extending time to achieve promotion that focus on processes to support ACFW to achieve promotion and tenure, wider supportive initiatives are needed to address persistent gender disparity for ACFW in the workplace. For example, policies and programs that could support the success of ACFW include increasing flexible work schedules, increasing funding and resources for early childhood care, reducing administrative burden, investing in systems to increase medical documentation efficiency, and identifying and supporting faculty during periods of heightened stress. In the short term, modifications in promotion and tenure timeline should be considered for several years in part to ameliorate the impact of COVID-19 on ACFW.

CRedit authorship contribution statement

S.I. Patel: Conceptualization, Data curation, Investigation, Project administration, Supervision, Validation, Visualization, Writing –

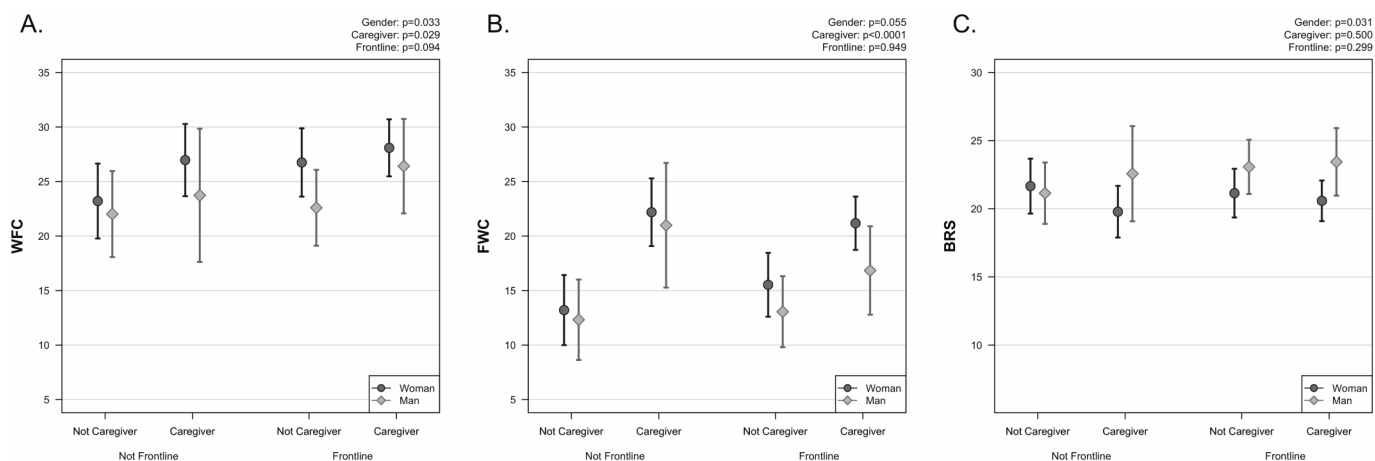


Fig. 1. A-1C: Estimated Marginal Means of wellbeing metrics and Sociodemographic Characteristics across Academic Clinical Frontline-Workers Status. WFC, FWC, and BRS by gender, caregiver, and frontline worker status. The figure reports estimated marginal means with 95% confidence intervals from linear models of the outcome measure (Fig. 1A: WFC; Fig. 1B: FWC; Fig. 1C: BRS) by respondents’ gender, caregiver status, and frontline worker status. P-values for the main effects for gender, caregiver, and frontline are each adjusted for the effects of the other two predictors.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2023.102517>.

References

- American Association for Public Opinion Research. Best Practices for Survey Research - AAPOR. Accessed July 25, 2022. <https://www.aapor.org/Standards-Ethics/Best-Practices.aspx>.
- Arora, V.M., Wray, C.M., O'Glasser, A.Y., Shapiro, M., Jain, S., 2021. Leveling the Playing Field: Accounting for Academic Productivity During the COVID-19 Pandemic. *J Hosp Med.* 16 (2), 120–123. <https://doi.org/10.12788/jhm.3558>.
- Association of American Medical Colleges (AAMC). Underrepresented in Medicine Definition. AAMC. Accessed June 10, 2022. <https://www.aamc.org/what-we-do/equity-diversity-inclusion/underrepresented-in-medicine>.
- Balai MK, Avasthi RD, VA R, Jonwal A. Psychological Impacts among Health Care Personnel during COVID-19 Pandemic: A Systematic Review. . 2022;11(2):118-125. doi:10.34172/jcs.2022.14.
- Jerica M. Berge, Rebecca L. Freese, Kait Macheledt, Sophie Watson, Snigdha Pusala-vidyasagar, Alicia Kunin-Batson, Rahel G. GhebreKatie Lingras An L. Church, Roli Dwivedi, Nissrine Nakib, Catherine McCartyStephanie Misono, Elizabeth A. Rogers, Sima Patel, Sade Spencer. Intersectionality and COVID-19: Academic Medicine Faculty Lived Experiences of Well-being, Workload, and Productivity During the Pandemic. *Journal of Women's Health*, in press.
- Carr, R.M., Lane-Fall, M.B., South, E., Brady, D., Momplaisir, F., Guerra, C.E., Montoya-Williams, D., Dalember, G., Lavizzo-Mourey, R., Hamilton, R., 2021 Mar. Academic careers and the COVID-19 pandemic: Reversing the tide. *Sci Transl Med.* 10;13(584): eabe7189 <https://doi.org/10.1126/scitranslmed.abe7189>. PMID: 33692133.
- Cerrato, J., Cifre, E., 2018;. Gender Inequality in Household Chores and Work-Family Conflict. Accessed November 10, 2022 *Front Psychol.* 9. <https://www.frontiersin.org/articles/10.3389/fpsyg.2018.01330>.
- Chung, H., Seo, H., Forbes, S., Birkett, H., July 29, 2020.. Working from home during the COVID-19 lockdown: changing preferences and the future of work. Accessed November 10, 2022 Published. <https://wafproject.org/2020/05/20/covidwfh/>.
- Del Boca, D., Oggero, N., Profeta, P., Rossi, M., 2020. Women's and men's work, housework and childcare, before and during COVID-19. *Rev Econ Househ.* 18 (4), 1001–1017. <https://doi.org/10.1007/s11150-020-09502-1>.
- Dillon, E.C., Stults, C.D., Deng, S., et al., 2022. Women, Younger Clinicians', and Caregivers' Experiences of Burnout and Well-being During COVID-19 in a US Healthcare System. *J GEN INTERN MED* 37, 145–153. <https://doi.org/10.1007/s11606-021-07134-4>.
- Dragalis, J.R., Coons, S.J., Plaza, C.M., 2008. Best Practices for Survey Research Reports: A Synopsis for Authors and Reviewers. *Am J Pharm Educ.* 72 (1) <https://doi.org/10.5688/aj720111>.
- Firew, T., Sano, E.D., Lee, J.W., et al., 2020. Protecting the front line: a cross-sectional survey analysis of the occupational factors contributing to healthcare workers' infection and psychological distress during the COVID-19 pandemic in the USA. *BMJ Open.* 10 (10), e042752.
- Froessl, L.J., Abdeen, Y., 2021. The Silent Pandemic: The Psychological Burden on Frontline Healthcare Workers during COVID-19. *Psychiatry J.* 2021, 2906785. <https://doi.org/10.1155/2021/2906785>.
- Gabster, B.P., van Daalen, K., Dhart, R., Barry, M., 2020. Challenges for the female academic during the COVID-19 pandemic. *The Lancet.* 395 (10242), 1968–1970. [https://doi.org/10.1016/S0140-6736\(20\)31412-4](https://doi.org/10.1016/S0140-6736(20)31412-4).
- Halley, M.C., Mathews, K.S., Diamond, L.C., et al., 2021. The Intersection of Work and Home Challenges Faced by Physician Mothers During the Coronavirus Disease 2019 Pandemic: A Mixed-Methods Analysis. *J Womens Health.* 30 (4), 514–524. <https://doi.org/10.1089/jwh.2020.8964>.
- Harrington, E.E., Reese-Melancon, C., 2022. Who is responsible for remembering? Everyday prospective memory demands in parenthood. *Sex Roles.* 86 (3), 189–207. <https://doi.org/10.1007/s11199-021-01264-z>.
- Koontalay, A., Suksatan, W., Prabsangob, K., Sadang, J.M., 2021 Oct. Healthcare Workers' Burdens During the COVID-19 Pandemic: A Qualitative Systematic Review. *J Multidiscip Healthc.* 27 (14), 3015–3025. <https://doi.org/10.2147/JMDH.S330041>. PMID: 34737573; PMCID: PMC8558429.
- Kotini-Shah, P., Man, B., Pobee, R., et al., 2022. Work-Life Balance and Productivity Among Academic Faculty During the COVID-19 Pandemic: A Latent Class Analysis. *J Womens Health.* 31 (3), 321–330. <https://doi.org/10.1089/jwh.2021.0277>.
- 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. *J Womens Health.* 30 (3), 341–347. <https://doi.org/10.1089/jwh.2020.8710>.
- Löwe, B., Wahl, I., Rose, M., et al., 2010. A 4-item measure of depression and anxiety: Validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord.* 122 (1), 86–95. <https://doi.org/10.1016/j.jad.2009.06.019>.
- Mache, S., Bernburg, M., Vitzthum, K., Groneberg, D.A., Klapp, B.F., Danzer, G., 2015. Managing work–family conflict in the medical profession: working conditions and individual resources as related factors. *BMJ Open.* 5 (4), e006871.
- Madsen, T.E., Dobiesz, V., Das, D., et al., 2020. Unique Risks and Solutions for Equitable Advancement during the Covid-19 Pandemic: Early Experience from Frontline Physicians in Academic Medicine. *Catalyst Non-Issue Content.* 1 (4) <https://doi.org/10.1056/CAT.20.0268>.
- Mantri, S., Song, Y.K., Lawson, J.M., Berger, E.J., Koenig, H.G., 2021. Moral Injury and Burnout in Health Care Professionals During the COVID-19 Pandemic. *J Nerv Ment Dis.* 209 (10), 720–726. <https://doi.org/10.1097/NMD.0000000000001367>.
- Misra, J., Lundquist, J.H., Templer, A., 2012. Gender, Work Time, and Care Responsibilities Among Faculty1. *Sociol Forum.* 27 (2), 300–323. <https://doi.org/10.1111/j.1573-7861.2012.01319.x>.

- Moors, A.C., Stewart, A.J., Malley, J.E., 2022. Gendered Impact of Caregiving Responsibilities on Tenure Track Faculty Parents' Professional Lives. *Sex Roles*. 87 (9–10), 498–514. <https://doi.org/10.1007/s11199-022-01324-y>. Epub 2022 Nov 4. PMID: 36373019; PMCID: PMC9638246.
- Netemeyer RG, Boles JS, McMurrian R. Development and validation of work–family conflict and family–work conflict scales. *J Appl Psychol*. 19980201;81(4):400. doi: 10.1037/0021-9010.81.4.400.
- Qualtrics. Version February 2021. Qualtrics; 2022. <https://www.qualtrics.com/>.
- Salari, N., Khazaie, H., Hosseini-Far, A., Khaledi-Paveh, B., Kazemina, M., Tong, J., Zhang, J., Zhu, N., Pei, Y., Liu, W., Yu, W., Hu, C., Sun, X., 2023 Jan. Effects of COVID-19 pandemic on mental health among frontline healthcare workers: A systematic review and meta-analysis. *Front Psychol*. 27 (13), 1096857. <https://doi.org/10.3389/fpsyg.2022.1096857>. PMID: 36778177; PMCID: PMC9912473.
- Schieman, S., Badawy, P.J.A., Milkie, M., Bierman, A., 2021. Work-Life Conflict During the COVID-19 Pandemic, 2378023120982856 *Socius*. 7. <https://doi.org/10.1177/2378023120982856>.
- Sinclair, V.G., Wallston, K.A., 2004. The Development and Psychometric Evaluation of the Brief Resilient Coping Scale. *Assessment*. 11 (1), 94–101. <https://doi.org/10.1177/1073191103258144>.
- Smith, B.W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., Bernard, J., 2008. The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med*. 15 (3), 194–200. <https://doi.org/10.1080/10705500802222972>.
- Staniscuaski, F., Kmetzsch, L., Soletti, R.C., et al., 2021. Gender, Race and Parenthood Impact Academic Productivity During the COVID-19 Pandemic: From Survey to Action. *Front Psychol*. 12, 663252 <https://doi.org/10.3389/fpsyg.2021.663252>.
- Sumner, R.C., Kinsella, E.L., 2020. Grace Under Pressure: Resilience, Burnout, and Wellbeing in Frontline Workers in the United Kingdom and Republic of Ireland During the SARS-CoV-2 Pandemic. *Front Psychol*. 11, 576229 <https://doi.org/10.3389/fpsyg.2020.576229>.
- Umbetkulova, S., Kanderzhanova, A., Foster, F., Stolyarova, V., Cobb-Zygadlo, D., 2023 May. Mental Health Changes in Healthcare Workers DURING COVID-19 Pandemic: A Systematic REVIEW of Longitudinal Studies. *Eval Health Prof*. 4 <https://doi.org/10.1177/01632787231165076>, 1632787231165076 Epub ahead of print. PMID: 37143216; PMCID: PMC10160822.
- Woitowich, N.C., Jain, S., Arora, V.M., Joffe, H., 2021. COVID-19 Threatens Progress Toward Gender Equity Within Academic Medicine. *Acad Med J Assoc Am Med Coll*. 96 (6), 813–816. <https://doi.org/10.1097/ACM.0000000000003782>.