

Are we failing female and racialized academics? A Canadian national survey examining the impacts of the COVID-19 pandemic on tenure and tenure-track faculty

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Abstract

The novel coronavirus 2019 (COVID-19) pandemic caused the abrupt curtailment of on-campus research activities that amplified impacts experienced by female and racialized faculty. In this mixed-method study, we systematically and strategically unpack the impact of the shift of academic work environments to remote settings on tenured and tenure-track faculty in Canada. Our quantitative analysis demonstrated that female and racialized faculty experienced higher levels of stress, social isolation and lower well-being. Fewer women faculty felt support for health and wellness. Our qualitative data highlighted substantial gender inequities reported by female faculty such as increased caregiving burden that affected their research productivity. The most pronounced impacts were felt among pre-tenured female faculty. The present study urges university administration to take further action to support female and racialized faculty through substantial organizational change and reform. Given the disproportionate toll that female and racialized faculty

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experienced, we suggest a novel approach that include three dimensions of change: (1) establishing quantitative metrics to assess and evaluate pandemic-induced impact on research productivity, health and well-being, (2) coordinating collaborative responses with faculty unions across the nation to mitigate systemic inequities, and (3) strategically implementing a storytelling approach to amplify the experiences of marginalized populations such as women or racialized faculty and include those experiences as part of recommendations for change.

KEYWORDS

COVID-19, health, research, social, tenured and tenure-track faculty, university, well-being

1 | INTRODUCTION

Universities are arguably the social institution primarily responsible for the production of formal knowledge (Adams, 2013; Freeman & Huang, 2014; Godin & Gingras, 2000). Diversity among researchers increases both the quality and impact of research results. Epistemologically, we ought to care about the diversity of researchers within academic institutions, because individual knowledge production is influenced (and on some accounts determined) by the situated perspective of the knower. A researcher's culture, social position, and life experiences will always be the starting point from which researchers approach their research questions (Babbitt, 1993; Harding, 1992, 2004, 2008; Smith, 1974). When a diverse group of individuals ask questions, corresponding outputs to these questions have broader reach (Smith, 1974, 2021). In Canada, the large majority of universities are public institutions, funded by tax dollars, and as such should both reflect and benefit a broadly diverse democratic society.

However, if a group absent of individual or identity diversity is responsible for setting research agendas within particular disciplines, it furthers the marginalization of diverse identities and ways of knowing. Historically, women have been left out of many disciplines and research programs, which has resulted in skewed research results and the further marginalization of women within society (Collins, 1986; Narayan, 2004; Roberts, 1996). The existence of structural inequities in the university is well-researched, and the novel coronavirus pandemic may exacerbate them further. Established mechanisms for gender inequity in academia include: (1) historical legacies, (2) hiring of senior professors, (3) differing promotion rates, (4) fewer women in leadership positions, and (5) discretionary earnings (Roos, 2008). The organizational culture of universities differentially impacts female and racialized individuals, even when discriminatory practices are not overt (Agogino, 2007).

The COVID-19 pandemic was declared by the World Health Organization in March 2020. Governments around the world launched "lockdown measures" and new regulations almost overnight to minimize virus transmission and protect the population (Lippi et al., 2020). In universities, tenured and tenure-track research faculty rapidly shifted their work environments to home and some navigated unfamiliar virtual platforms. For many, the new guidelines resulted in immediate loss of, or limited access to research facilities, research-related travel, personnel (e.g., graduate students), and equipment. These changes come to a sector already operating under structural inequities. As universities strive to find avenues to continue conducting high-quality research with hopes of establishing a new normal, a critical step forward is to identify known structural inequities present in universities and ascertain whether the pandemic has amplified these structural inequities.

It is well established that structure inequities in universities exist (Eslen-Ziya & Yildirim, 2022; Guy & Arthur, 2020; Roos, 2008; Sobande & Renee Wells, 2021). The extent that the pandemic has exacerbated these structural inequities remains unknown, though research has begun to emerge exploring impacts on certain university communities (Górska et al., 2021; Kasymova et al., 2021; Wagner et al., 2021). While the initial goal of the present mixed-method inquiry aimed to inform the organizational post-pandemic response strategy of universities, emerging evidence indicates that the pandemic is demonstrating disproportionately negative effects on female and racialized faculty and their ability to conduct research (Frederickson, 2020; Lutter & Schröder, 2020). Reasons for these pandemic-related structural inequities range from closure of schools, summer camps, and daycares, placing increased burden on the primary caregiver, which is predominantly mothers (Lutter & Schröder, 2020). This crisis is also experienced more strongly among racialized individuals who are often considered victims of the intersectional/interlocking systems of oppression (Zambrana et al., 2021). The pandemic has caused higher rates of illness and greater illness severity among racialized individuals leading to heightened caregiving responsibilities and emotional exhaustion (Artiga et al., 2020). Together, these factors negatively impact racialized faculty and hamper their ability to optimally engage in research (Baker, 2020).

A critical area to understand and review in academia is racial, gender identity, and biological sex differences. Since the Enlightenment period, sex dichotomy has become the foundational element to guide or shape the laws of gender (Prasad, 2007, 2012). Prasad (2012) argued that the socio-historical development of strategic essentialism played a key role in recent social movements for gender and racial equity. The social construction of gender, to some extent, reflected the ongoing power dynamics and politics in our society. Feminist scholars such as Butler (1990), and West and Zimmerman (1987) argued the desire of fixity and conformity forced individuals continuously engaging in “doing gender” performative routines. Building on the social role theory, Eagly et al. (2000) offered an in-depth discussion on the socio-historical development and transformation of sex differences and similarities. They argue that gender roles reflect the society's distributions of men and women into breadwinner and homemaker roles and into occupations. Such criticism is considered a response to the division of labor in most western societies since the industrial revolution. Gender stereotypes were constantly introduced and renewed through generations of political, mass media, and institutional influences. For instance, stereotypically masculine physical qualities are considered identifiers of success in occupations (Eagly et al., 2000). In a male-dominated societal setting, females are constantly portrayed as subordinates to men. The connection to the domesticity role limited not only females' economic status but also their power and social status in the society (Rhoadie, 1989).

In academia, sex-based or race-based stereotypes, inequality, or harassment have been reported for an ongoing basis (Bell et al., 2021; Blithe & Elliott, 2020; Fernando & Prasad, 2019; Frey, 2018; Morton, 2018; Pyke, 2018; Utoft, 2021). The salaries of white women and women of color are constantly lower than men in higher education institutions (Shulman et al., 2017). Other studies also reported that female faculty members are less likely to be tenured or promoted (Acker et al., 2012; Ginther & Hayes, 2003; Kim & Cooc, 2021; Morton, 2018; Perna, 2001; Wolfinger et al., 2008) or to receive competitive grant funding (Steinþórsdóttir et al., 2020). Kachchaf et al.'s (2015) study on the intersectionality of race/ethnic and gender identities showed that women of color in science, technology, engineering, and mathematics experienced greater obstacles and struggles in meeting the ideal worker expectation (see also Wolf-Wendel & Ward, 2015). Findings from these studies not only offer evidence of gender and racial inequity, but also reflect the long-existing structural issues in the “winner-take-all” and “greed-driven” academia (Rosa, 2021). Even though the majority of the higher education institutions have implemented policies and programs to ensure gender and racial equity, scholars like Huppatz et al. (2019) remain skeptical about such men-driven gender-neutral initiatives.

Sex-based, gender-based, or race-based differences impact the career advancement of faculty members and their mental health (Zambrana et al., 2021), stress level (Smith & Calasanti, 2005; Stanley, 2006), social relationship (Fritsch, 2015), job satisfaction, family life (McCutcheon & Morrison, 2016; Thun, 2020), and work-life balance (Denson et al., 2018; Rosa, 2021). Extant literature reported that female faculty are often affected by care-giving,

and domestic responsibilities (Misra et al., 2012). Racialized females also experience “multiple marginalization” in academia (Hirshfield & Joseph, 2012).

While it is true that gender- or race-based discriminations and stereotypes are not new in the fields of organization and gender studies, how disruptive events like the COVID-19 pandemic impact such experiences and the institutional norms remain under-studied. Early research on the impact of the global pandemic reported that more females lost their jobs and experienced work disruption due to the increased domestic responsibilities (Carli, 2020). Females also reported lower productivity and job satisfaction during the pandemic (Feng & Savani, 2020).

This mixed-methods study aimed to gain an in-depth understanding of the impact of the COVID-19 pandemic on tenured and tenure-track faculty using public Canadian universities as a case study. Our project was contextualized within an understanding of organizational or job-related stressors related to academic researchers (Dua, 1994). Our empirical exploration examined the impact of the pandemic by sex and racialized status. The findings of this study will contribute to providing insight on health and social-wellness systemic inequities amplified by the pandemic. These data will provide a benchmark that universities can use to evaluate the organizational response in reducing systemic inequities.

2 | RESEARCH METHODS

This study adopted a mixed-methods approach to explore tenured and tenure-track faculty members' experience with the COVID-19 disruption to research in Canada. In May/June 2020, we conducted a cross-sectional nation-wide online survey with tenured and tenure-track faculty who were employed at a public university located in Canada. Due to the differences of public and private universities in terms of private, provincial and federal funding structures as well as governance structures, this study focused solely on public universities in Canada. Such focus also allowed us to understand how tenure-track and tenured faculty members were impacted by the pandemic while operating under a similar organizational structure. A total of 781 participants agreed to complete the survey. Of these, 549 completed surveys were included in our analysis; we excluded those surveys with missing data.

In Canada, the most constraining public health restrictions were in place during April and May 2020. This survey was implemented during this time to capture the health and social-wellness impacts. The survey consisted of the following sections: eligibility (two questions), demographic information (19 questions), health-related behavior (13 questions), and social impact (five questions). We also examined the presence of biological sex-differences among the observed health and social well-being impacts of COVID-19 on tenured and tenure-track faculty. Demographic information included: age, biological sex, race, ethnicity, faculty position, primary faculty affiliation (public, research group, center affiliation), area of research, research group lead, number of members in the associated research group, minority status, caregiver status, number of children (if relevant), number of hours typically worked per week, number of weeks working from home and whether COVID-19 has impacted the ability to balance work with demands outside of work. To gain a better understanding of the personal experience of the respondents, we collected information on qualitative responses using open-ended long-answer questions such as individual's challenges during the global pandemic, institutional health and social well-being COVID-19 related responses, and individuals' perspective on universities COVID-19 contingency plans from a health and social-wellness.

3 | HEALTH & SOCIAL-WELLBEING

Eight questions were constructed to ascertain individual's health status of respondents. Stress was ascertained via a scale of 1–10 where a score of 0 indicated “not at all stressed” and a score of 10 indicated “extremely stressed”. Health behaviors and self-reported health behavior changes were collected for tobacco use, cannabis use, alcohol consumption and physical activity. For tobacco and cannabis, participants were asked to report usage as (1) never,

(2) former, (3) current occasional, (4) current frequent. Participants were asked to classify their alcohol usage as (1) never, (2) alcoholic, (3) occasional intake, (4) frequent (i.e., weekly) intake, (5) daily intake. Participants were also asked whether their usage of tobacco, cannabis and alcohol increased, decreased, or stayed the same during the pandemic. Participants were asked to self-report their level of physical activity (daily, 5–6 days per week, 3–4 days per week, 1–2 days per week, I do not exercise). Subsequently, participants were asked whether their physical activity habits increased, decreased or stayed the same during the pandemic.

Social well-being was assessed using the ICEpop CAPability measure for Adults (ICECAP-A; Al-Janabi et al., 2012) as well as questions regarding pre-pandemic and current self-reported perception of social isolation and mood (i.e., depression). The ICECAP-A Instrument is a measure of capability for all adults (18 years and older). The ICECAP-A comprises five attributes (stability, attachment, autonomy, achievement, and enjoyment), each with four levels. These 5 attributes are used to produce a single summary score where “1” indicated full capability well-being and “0” indicates no capability well-being.

3.1 | Data analysis strategies

For the quantitative analysis, we report descriptive statistics for available cases in the full cohort and also stratified by biological sex using mean (standard deviation) and frequency (percent) where appropriate. We acknowledge that using biological sex instead of gender in this analysis may limit our capacity to capture gender-related complexity in the academic setting. Prasad (2012) pointed out that the positivist paradigm to some extent constrained the capability to capture the fluidity in sexual identity. However, we believe biological sex is the personal characteristic that readily captures perceivers' attention (Eagly et al., 2000; Prasad, 2012). The binary approach of biological sex also provides a strong basis of categorizing people, even when compared with race, age, and rank in our current study.

We examined the normality and skewness of the data. We employed an analysis of variance (ANOVA), Independent *t*-tests, and chi square tests to determine the presence of any differences in demographic, health, social or economic quantitative variables collected by biological sex and by minority status. All quantitative analyses were conducted utilizing STATA version 13.0 and an alpha was set at $p < 0.05$ to indicate statistical significance.

For the qualitative analyses, we coded the participant responses according to the three stages of qualitative analysis outlined by Strauss and Corbin (1998): open coding, axial coding and selective coding. In the initial open coding stage, three readers (SNS, EL, and JCD) repeatedly read participant responses from the long answer open-ended survey questions to highlight sections of data that informed the research question. We ascribed individual codes representing main concepts to each line of the transcript. We then clustered ideas together to form emergent themes by sorting and condensing codes based on similar concepts (axial coding). We also explored relationships between codes. This stage was an iterative process. The codebook was developed by two co-authors (SNS and EL) who ascertained agreement with the final set of code before analyzing the responses. Any discrepancies were resolved by a third party (JCD). We completed the conclusion drawing and verification stage (selective coding) and established a finalized set of overarching themes. From our selective coding, we generated a final list of higher-level themes and associated categories that captured the main ideas provided by the participants qualitative responses. We defined saturation as the point where no new additional emergent themes were identified.

4 | FINDINGS

Among the 549 participants, 52% of participants were female and 15% reported minority status. The mean age of participants was 48 (SD: 10) years and, 58% were married. 90% of respondents were assistant (29%), associate (31%), or full professors (30%) while 10% comprised senior leadership positions (i.e., President, Vice-President, Dean, Department Head, and Director). Seventy-two percent of participants reported primary caregiver (i.e., children or older adults or both) responsibilities with a mean number of 1 (SD: 1) child. Participant demographics split by biological sex and minority status are reported in Table 1.

Most respondents (79%) reported a disruption to balancing the usual demands of work with their outside of work obligations due to the COVID-19 pandemic. Table 2 summarizes the health status and behaviors as well as the well-being of participants characterized by biological sex and minority status. On average, participants reported an above average well-being score from the ICECAP-A of 0.760 (SD: 0.175), a higher than average stress level of six (SD: 2; 0–10 scale) and an average level of social isolation with a mean of five (SD: 3; 0–10 scale). There was a significant ($p < 0.001$) difference by biological sex with female participants reporting higher levels of stress, social isolation and lower well-being. There was also a significant ($p < 0.001$) difference by minority status with minority status individuals reporting higher stress, social isolation and lower well-being.

Health behaviors were also ascertained. The majority (80%) of participants report never using tobacco. In contrast, few participants (12%) report never using alcohol. Almost half (46%) of participants report frequent or daily use of alcohol. Thirty-one percent of participants report increased alcohol usage related to the COVID-19 pandemic. Three-quarters of participants report never using cannabis. Of those who use cannabis, 4% report an increased usage due to the COVID-19 pandemic. There was a significant difference in cannabis usage change during the pandemic ($p = 0.042$), alcohol use ($p < 0.001$), and pandemic-related alcohol use ($p < 0.001$) between individuals with minority status compared with those who did not report minority status. Individuals with non-minority status reported higher alcohol usage and a higher proportion of increased alcohol usage related to the pandemic. Lastly, the majority (91%) of respondents report some form of physical activity ranging from daily (21%) to 1–2 days per week (24%). Almost half (47%) of the participants report decreased physical activity as a result of the pandemic. There were no significant differences in physical activity behavior by biological sex or minority status.

Faculty provided their perceptions of their own university's contingency plans based on three dimensions of support provided by their university during the pandemic. Overall, 67% felt financially supported, 56% felt socially supported, and 50% felt supported in their health and wellness. However, there was a significant difference by biological sex for the perceptions regarding health and wellness ($p = 0.0420$) with a lower proportion of female feeling health and wellness support. These statistically significant results provide empirical support for the notion that women and racialized faculty members experienced struggles during the global pandemic, and this re-emphasizes the need to revisit the systemic issues facing these individuals in university settings.

To further unpack the struggles experienced by different groups of faculty, our qualitative analysis seeks to present several emergent themes based on our three-stage coding activities. In total, 545 completed qualitative responses were analyzed. We assigned two coders to go through the qualitative responses. Our findings showed substantial differences among females and males were evident regarding access to external and internal funding (75% of coded responses). Females and males demonstrated substantial differences with their family challenges due to caregiver responsibilities (Female: 68.2% vs. Male: 31.8%), experiencing mental health issues (Female: 67.2% vs. Male: 32.8%), and administrative duties at the universities (Female: 66.7% vs. Male – 33.3%). A greater proportion of male faculty expressed “no impact” (73% of the coded responses) or “positive impact” (56% of the coded responses) on their research productivity compared to their female counterparts. Challenges male faculty experienced during the pandemic were the limited access to lab and research facilities on campus (55% of the coded responses). Male faculty reported being more socially isolated (56% of the coded response) during the pandemic. Overall, female faculty reported being more affected in all areas except A1 (Lab Access) & A4 (Access to Assistants; Table 3).

TABLE 1 Participant demographics

Participant characteristics	Total n (%)	Females n (%)	Males n (%)	Minority ^a n (%)	Not a minority n (%)	p-value by sex & minority
Age (mean, SD)	48 (10)	46 (10)	50 (11)	46 (10)	48 (10)	0.000 ^a 0.036 ^a
Biological Sex	<i>n</i> = 696			<i>n</i> = 105	<i>n</i> = 588	
Females	362 (52)			50 (48)	311 (53)	N/A
Males	314 (45)			50 (48)	263 (45)	0.626
Prefer not to say	20 (3)			5 (4)	14 (2)	
Academic position	<i>n</i> = 702	<i>n</i> = 361	<i>n</i> = 314	<i>n</i> = 105	<i>n</i> = 588	
Assistant Professor	205 (29)	127 (35)	73 (23)	45 (43)	157 (27)	
Associate Professor	217 (31)	120 (33)	89 (28)	30 (29)	185 (31)	
Professor	213 (30)	84 (23)	118 (38)	21 (20)	190 (32)	0.017 ^a
Director	31 (4)	19 (5)	12 (4)	5 (5)	26 (4)	0.022 ^a
Department Head	25 (4)	9 (2)	14 (4)	2 (2)	22 (4)	
Dean/Vice Provost/Provost/Vice President	11 (2)	2 (1)	8 (3)	2 (2)	8 (1)	
Relationship status	<i>n</i> = 697	<i>n</i> = 361	<i>n</i> = 313	<i>n</i> = 104	<i>n</i> = 588	
Single	82 (12)	52 (14)	29 (9)	11 (11)	70 (12)	
Married	473 (68)	231 (64)	227 (73)	73 (70)	396 (67)	
Divorced	33 (5)	15 (4)	16 (5)	4 (4)	29 (5)	0.255
Widowed	19 (3)	12 (3)	5 (2)	3 (3)	16 (3)	0.948
Common-law partner	76 (11)	45 (12)	28 (9)	12 (12)	64 (11)	
Separated	14 (2)	6 (2)	8 (3)	1 (1)	13 (2)	
Minority status	<i>n</i> = 694	<i>n</i> = 361	<i>n</i> = 313			
Yes	105 (15)	50 (14)	50 (16)			0.626
No	589 (85)	311 (86)	263 (84)			N/A
Primary caregiver	<i>n</i> = 696	<i>n</i> = 361	<i>n</i> = 314	<i>n</i> = 104	<i>n</i> = 588	
Children	218 (31)	98 (27)	115 (37)	25 (24)	192 (33)	0.024 ^a
Older Adults	283 (41)	182 (50)	111 (35)	42 (40)	242 (41)	0.134
Children and Older Adults	2 (0)	1 (0)	1 (0)	0 (0)	2 (0)	
Not a caregiver	193 (28)	80 (22)	87 (28)	37 (36)	141 (24)	
Children (yes/no)						
# of Children (mean, SD)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0.000 ^a 0.272
Impact of COVID-19 on work-life balance	<i>n</i> = 696	<i>n</i> = 360	<i>n</i> = 312	<i>n</i> = 103	<i>n</i> = 586	0.001 ^a
Yes	551 (79)	304 (84)	226 (72)	80 (78)	465 (79)	0.839
No	145 (21)	56 (16)	86 (28)	23 (22)	121 (21)	

^aThe p-values represent chi-square tests, ANOVA, and t-tests for categorical and continuous variables, respectively between (1) biological sex and (2) minority status.

TABLE 2 Health & wellbeing

Health and wellbeing variables	Total n (%)	Female n (%)	Males n (%)	Minority ^a n (%)	Not a minority n (%)	p-value by sex & minority
Stress level	6 (2)	7 (2)	6 (2)	7 (2)	6 (2)	0.000 ^a 0.0024 ^a
Social Isolation	5 (3)	5 (3)	5 (3)	5 (2)	5 (3)	0.690 0.607
Tobacco usage	n = 695	n = 360	n = 310	n = 103	n = 584	
Never	555 (80)	289 (80)	250 (81)	87 (84)	463 (79)	0.984
Former	116 (17)	59 (16)	50 (16)	15 (15)	99 (17)	0.385
Occasional	17 (2)	9 (3)	6 (2)	1 (1)	15 (3)	
Frequent	7 (1)	3 (1)	4 (1)	0 (0)	7 (1)	
Cannabis usage	n = 692	n = 358	n = 309	n = 104	n = 590	
Never	500 (72)	264 (74)	219 (71)	84 (81)	409 (69)	0.348
Former	83 (12)	41 (11)	38 (12)	5 (5)	78 (13)	0.060 ^a
Occasional	94 (14)	47 (13)	43 (14)	14 (13)	79 (13)	
Frequent	15 (2)	6 (2)	9 (3)	1 (1)	14 (2)	
Pandemic related change in cannabis usage	n = 683	n = 355	n = 307	n = 103	n = 574	0.936
Never a cannabis user	637 (93)	329 (93)	288 (94)	97 (94)	535 (93)	0.042 ^a
Decreased	16 (2)	10 (3)	6 (2)	5 (5)	11 (2)	
Increased	30 (4)	16 (5)	13 (4)	1 (1)	28 (5)	
Alcohol usage	n = 695	n = 360	n = 311	n = 104	n = 584	
Never	82 (12)	46 (13)	31 (10)	32 (31)	49 (8)	
Former	7 (1)	4 (1)	3 (1)	1 (1)	6 (1)	0.190
Occasional	287 (41)	158 (44)	120 (39)	44 (42)	240 (41)	0.000 ^a
Frequent	232 (33)	116 (32)	111 (36)	17 (16)	214 (37)	
Daily	87 (13)	36 (10)	46 (15)	10 (10)	75 (13)	
Pandemic related change in alcohol usage	n = 693	n = 360	n = 309	n = 102	n = 584	0.128
No change	343 (49)	175 (49)	155 (50)	46 (45)	293 (50)	0.000 ^a
Decreased	67 (10)	28 (8)	37 (12)	8 (8)	58 (10)	
Increased	215 (31)	120 (33)	90 (29)	24 (24)	189 (32)	
Not applicable	68 (10)	37 (10)	27 (9)	24 (24)	44 (8)	
Physical activity. I exercise:	n = 694	n = 358	n = 311	n = 104	n = 582	
Daily	143	67 (19)	74 (24)	30 (29)	111 (19)	0.219
5-6 days per week	171	97 (27)	64 (21)	25 (24)	143 (25)	0.007 ^a
3-4 days per week	154	76 (21)	75 (24)	20 (19)	134 (23)	
1-2 days per week	166	90 (25)	69 (22)	14 (13)	149 (26)	
Never	60	28 (8)	29 (9)	15 (14)	45 (8)	

TABLE 2 (Continued)

Health and wellbeing variables	Total n (%)	Female n (%)	Males n (%)	Minority ^a n (%)	Not a minority n (%)	p-value by sex & minority
Pandemic related change in physical activity	n = 697	n = 360	n = 312	n = 104	n = 585	0.615
No change	171 (25)	84 (18)	84 (27)	19 (18)	152 (26)	0.222
Decreased	325 (47)	170 (47)	141 (45)	55 (53)	265 (45)	
Increased	201 (29)	106 (29)	87 (28)	30 (29)	168 (29)	
ICECAP-A	0.760 (0.175)	0.741 (0.178)	0.788 (0.166)	0.731 (0.186)	0.765 (0.173)	0.0002 ^a 0.0477 ^a

^aThe p-values represent chi-square tests, ANOVA, and t-tests for categorical and continuous variables, respectively between (1) biological sex and (2) minority status.

TABLE 3 First-order and second-order code frequency (Percentages)

Second order code	First order code	Females (1)	Males (2)	Prefer not to say (3)
		Percentages (%)		
A – Research disruption	A1 – Lab/Equipment/Facilities access	41.9	54.8	3.2
	A2 – Research participant recruitment	63.0	35.2	1.9
	A3 – Research progress/Data collection disruption/Changes	57.9	40.3	1.9
	A4 – Access to research students/Assistantships	47.1	51.0	2.0
	A5 – Research travels	50.7	45.1	4.2
	A6 – Access to research funding (granted)	63.0	37.0	
	A7 – Access to funding opportunities (internal)	71.4	28.6	
	A8 – Access to funding opportunities (external)	75.0	25.0	
	A9 – Challenges to publication, change in strategies	60.7	35.7	3.6
	A10 – Challenges to research collaborators (academic)	60.0	40.0	
	A11 – Access to collaborators (community/industry)	51.6	45.2	3.2
	A12 – Increase research demand	61.9	38.1	
	A13 – No impact	26.7	73.3	
	A14 – Low productivity	56.0	40.7	3.3
	A15 – Challenges in communication	56.0	40.0	4.0
	A16 – Positive impact	44.4	55.6	
B – Teaching	B1 – Challenges to online teaching	63.8	34.5	1.7
C – Services	C1 – Increase administrative duties	66.7	33.3	
	C2 – Additional support to students	60.5	36.8	2.6
D – Health	D1 – Mental health	67.2	32.8	
	D2 – Physical health	62.5	37.5	
	D3 – Motivation	60.0	40.0	
	D4 – Other health related issues		100.0	
E – Social/Family	E1 – Family challenge (caregiver)	68.2	31.8	
	E2 – Social isolation	37.0	55.6	7.4
F – Others	F1 – Irrelevant	55.6	44.4	

To provide insights into underlying reasons for the observed responses, we extracted related qualitative data from our survey regarding the challenges experienced by tenured and tenure-track faculty, research disruptions often associated to lab closure and research curtailment. For example, an Associate Professor (40 year-old female) reported the loss of her access to data necessary for research: *"We lost access to Statistics Canada data that we were using, since it's only available in a staffed facility in the (university) library"*. Another participant (62 year-old female, Full Professor) expressed that the global pandemic halting her research and the restarting was at a slow pace: *"We halted all of our research, but this research was not 'trials.' All of our projects ground to a halt in March (2020) due to the loss of access to labs and equipment. We are now restarting, but at a slower pace due to restrictions"*. All the above statements illustrated the vulnerability and struggles experienced by research faculty members during the beginning of the pandemic.

Since all the Canadian public universities had to abide to the newly implemented safety protocols, the majority of research faculty were not allowed to access their laboratories or on-campus facilities. Even though universities quickly adjusted their protocols in mid-summer 2020, new restrictions such as social distancing and reduced occupancy of indoor shared facilities impacted many tenured and tenure-track faculty's research plan and productivity, in particular researchers who relied on laboratory and on-campus facilities.

While the limited access to on-campus research facilities applied to all research faculty, our qualitative analysis identified two overarching themes that impacted female faculty the most: (1) "research disruption from caregiver burden" and (2) negative health impacts for female faculty.

Echoing existing literature on the struggles of women faculty members due to domestic responsibilities such as childcare (Acker et al., 2012; Ginther & Hayes, 2003; Kim & Cooc, 2021; Morton, 2018; Perna, 2001; Wolfinger et al., 2008), our findings reported additional caregiving responsibilities disadvantaged women faculty, especially those with school-aged children during the COVID-19 pandemic. Many female faculty shared challenges associated with the lack of the quality research time and the lack of space for continuing their research activities in a "work-from-home" setting.

Some participants underscored the significant exhaustion, burnout and burden associated with caregiving. For example, an associate professor (40 year-old female) highlighted that she was doing less research due to time spent looking after her children. *"I am not doing as much research due to spending time looking after my children"*. Another associate professor (44 year-old female, visible minority) reported less time for herself to sleep, exercise or relax due to childcare responsibilities and her efforts to maintain research productivity: *"I have a 2 year-old (please consider this point relative to the productivity question - child born in 2018) who deserves and requires a great deal of my time, meaning I work throughout the night leaving little time for sleep, exercise, or relaxation."*

Overall, many female faculty highlighted caregiving as a priority and exhaustion, and reduced quality work time as consequences of the pandemic as illustrated in the quotes below.

"Emotionally, physically and mentally exhausted trying to keep the same level of productivity, while caring for and schooling two elementary school aged boys... and being a single parent" (Woman, 44, Associate Professor).

"I am currently a kindergarten teacher/daycare worker first and academic second." (Woman, Assistant Professor, single mom).

"No child care means less high-quality work time." (Woman, 48, Associate Professor).

The above narratives elucidated the prominent impact of caregiver burden on female faculty and how this has changed their work and life responsibilities. Compared to their men counterparts, most female faculty in our study reported being primary caregivers of the household. The remote working and remote learning settings forced female faculty members to put aside their research and university duties in order to support their children's growth and education. It is clear in our findings that faculty members with toddlers or school-aged children reported more

struggles than faculty without children or with adult children. The closure of daycare facilities in many provinces and the disappearance of summer camps or after-school activities during the first waves of COVID-19 pandemic demonstrate how disruptive events can impact research faculties, in particular the health and wellness of women. The multiple duties and new duties such as home-schooling were burdening women faculty members to an extreme degree forcing them to pause or sometimes discontinue their research commitments in order to keep their family in good order. It is clear that some women faculty members are picking up second, or third, or fourth shifts (see also Hochschild & Machung, 1989) during the pandemic while their men or single counterparts were able to remain focused on their work responsibilities.

While the above statements showcased female faculty members' additional challenges, the responses also captured tenured faculty (especially males) who did not experience pressing issues during the pandemic and did not see the need to have any adjustment and special accommodation. For example, one Professor (57 year-old male) did not report negative consequences due to having protected time for research and being tenured. *"I am a tenured professor with sufficient funding and teaching buy-out"* (Male, 57, Professor). Comparable sentiments were echoed by other males who were at a later career stage, feeling supported by their university for at home infrastructure and being able to look after themselves.

"I am near the end of my career, and I am fine. I do my own trajectory. If this happened in my 30s, my whole research career would have been crashed as I was collecting data in people's homes and doing longitudinal research, oh my God, I would have been screwed ..." (Male, 59, Professor).

"By not hindering me. i.e., by keeping the central university computing systems up and running properly; letting me into my office and lab at least occasionally to fetch things. But additionally by helping to support my increased home (which is now work!) telecommunications bill" (Male, 45, Associate Professor).

"End the lockdown – we are educated people; let us look after ourselves" (Male, 57, Associate Professor).

Such divides in experience and supported needed are clearly informed by faculty's family-related responsibilities and career stage. With the reference of the long-existing gender and racial stereotypes in the men-dominant academia (Huppatz et al., 2019), such contradictory mindsets and responses to the pandemic escalated female faculty's worries about their career advancement. Such anxiety was reflected by female faculty's experience of negative health impacts during the COVID-19 pandemic. Many reported their struggles with mental health, and physical health-related issues. Some faculty reported difficulty focusing. For example, an Assistant Professor (35 year-old female) reported: *"I can't do my favorite sport right now, and it is the savior of my mental health. Without it I feel like it's harder to focus on research and work in general."* Other female faculty also reported comparable impacts ranging from negative physical impacts that included exhaustion, stress, and anxiety:

"I have noticed physical impacts from everything moving online (developed headaches and back pain), I find myself exhausted after zoom teaching/meetings in ways that I am not with in person meetings." (Female, 36, Assistant Professor)

"I am not so productive because of stress brought on by COVID. Because I am not productive I worry about not getting tenure" (Female, 61, Assistant Professor, visible minority)

"I am stressed and my anxiety has increased making it difficult to do my work" (Female, 55, Associate Professor)

"My spouse is also an academic and his job suddenly became uncertain due to economic shifts due to [COVID-19]. This loss would have HUGE implications for us as a family and causing significant additional stressors." (Female, 45, Associate Professor)

Even though universities were not greatly impacted by the economic downturn due to the global pandemic, it is clear that some female faculty, especially those pre-tenure, reported various sources of stressors such as job insecurity and anxiety about the lowered research productivity due to various pandemic-induced challenges. Our qualitative findings also reported that female faculty members often paid more attention to their students. A female Professor (74 years old) was unable to meet with her graduate students in person who were having mental health issues. She states: *"I cannot meet in person with my graduate students, two of whom are having mental health issues."* Another female professor (57 years old) expressed long-term concern for the consequences to graduate students embarking on their early careers. She explains: *"Trainees that I was supervising (graduate student, postdoc) are both mothers with pre-school or school age children. Finishing a graduate thesis, working on a time limited project (funding limits) and maximizing writing and productivity has been completely halted. Their research and activity all contribute to my research program. So everything has come to a halt. Impact on me long-term is minimal (because of my career stage). Impact on them as trainees who need papers, etc. is a lot more substantial."*

To better understand faculty members' needs during the COVID-19 pandemic, we invited survey respondents to list up to three most helpful ways they feel the university could help them sustain their research trajectory. Responses related to the request for additional financial support to sustain research activities and graduate assistantships as well as tenure-clock extension, reducing teaching and administrative loads, re-opening of research labs and facilities, and loosening research ethics restrictions (i.e., in-person field work, experiments, and interviews/focus groups). Female faculty also explicitly requested university administrators can consider struggles experienced by primary caregivers. A woman Associate Professor (48 years old) suggested that universities address equity issues for faculty who are primary caregivers through addressing barriers or providing accommodations. For example: *"Address equity issues with faculty members who are the primary caregivers. Either help to reduce barriers or make accommodations."* This suggestion was reiterated and expanded upon by other research faculty members.

"Clear and compassionate expectations for parents with young children who have no childcare that is messaged from the university at large and mirrored by department heads and center leaders" (Female, 43, Associate Professor).

"Provide on-site childcare (within public health restrictions) to children of faculty and staff (particularly if school is canceled in the summer)" (Female, 39, Assistant Professor).

"Greater clarity on plans to support research that has been delayed due to COVID-19, greater acknowledge and support of faculty who have had increased caregiver burdens during the pandemic" (Female, 45, Assistant Professor).

In addition to childcare responsibilities, many participants expressed concern about supporting extended family such as elderly parents during the pandemic: For example, a 41 year-old female faculty shares concerns about her ability to focus due to caregiving burden of older parents. They write: *"mental inability to focus due to concerns about family in home and more extended family (elderly parents requiring some support but do not live with me)"* (Female, 41, Associate Professor). As many of the researchers experienced the lack of high-quality work time due to adjustment to remote working and remote teaching, women faculty or faculty who were primary caregivers were more likely to experience more struggles due to the lack of child care support and other alternatives during the pandemic:

"I don't need help on the research trajectory, my research per se has not been impacted. The challenge is around social and mental well-being. The expectations of the university are not aligned with the daily living realities of most faculty at the moment, particularly those with kids" (Male, 47, Professor).

"I got a six-month extension to SSHRC funding that was at an end, I am spending it to do some of the most interesting work I ever did!!! My graduate student's SSHRC funding was extended. This was all an unforeseen windfall The social impact is big: I miss my colleagues. But I golf with one and golf courses opened!!" (Male, 59, Professor)

It is clear that the pandemic escalated primary caregivers' stress and struggles. It is important for university administration to consider how to offer holistic support to faculty members, especially those who experience increased responsibilities outside the work environment during the pandemic. The above qualitative data also feature some privileges tenured faculty experiences, as well as differences between male and female faculty where males expressed a self-interest focus. Many male faculty were expecting additional university financial support to their research assistants as well as their additional expenses (e.g., Zoom licenses, Internet bills, home office renovation). Female faculty, more often expressed concerns about their surrounding environment including the social and emotional well-being of their students and other staff.

Some of our female participants expressed the need to address bias that is systemic in the university:

"take appropriate action to mitigate gender bias, and 'properly' address the underlying problem of academic precarity such as actively exploring new options for faculty in precarious positions; standing up for them and including them in conversations about the changing academy" (Female, 45, Assistant Professor).

"Recognition of long-term impact of multiple moments and the differential impact for those working on community and/or in other parts of the world on research so that criteria for funding and recognition are altered and faculty facing these situations are not penalized for them in award structures and grant competitions ...open and honest dialogue about the ways in which remote learning demands impact research productivity in short-term, while also recognizing that the moment reinforces structural inequities introduced through programs like Canada Research Chairs, endowed chairs, etc. since those with reduced teaching or administrative responsibilities were less impacted. There also those whom the moment has created research opportunities ... that privileges particular fields and undermines the morale as well as the 'value' assigned to other fields. This is problematic for future issues of academic freedom and autonomy, as well as has the danger of reinforcing structural inequalities and norms that marginalize certain fields and people in academic" (Female, 50, Department Head).

The above statements highlight concerns about structural inequities that have long existed in universities and the fear of the further reinforcement of such inequalities during and after the pandemic. Some academic fields such as medicine and health research experienced more funding opportunities due to the COVID-19 pandemic. Yet, the travel bans and research curtailment policies prohibited researchers who often relied on fieldworks and community-based research methodologies. Notably, researchers who worked with disadvantaged or marginalized populations expressed their wishes to gain better support. For example, a female Professor (55 years old, visible minority) who identified as a visible minority explained: "... I would like to see more support for First Nations, Metis and Inuit researchers during COVID given the vulnerability of those communities"

Another visible minority participant (41 year-old female, Associate Professor) expressed her concerns about equity and hoped university administration can take the opportunity to address some long-existing issues in the academia:

“Open and honest dialogue about the ways in which remote learning demands impact research productivity in short-term, while also recognizing that the moment reinforces structural inequities introduced through programs like CRCs (Canada Research Chairs program), endowed chairs, etc. since those with reduced teaching or administrative responsibilities were less impacted. There also those for whom the moment has created research opportunities -- that privileges particular fields and undermines the morale as well as the “value” assigned to other fields. This is problematic for future issues of academic freedom and autonomy, as well as has the danger of reinforcing structural inequalities and norms that marginalize certain fields and people in academia.”

In summary, the qualitative responses echoed the statistical significance of our quantitative analysis. Our findings showcased inequity and differences. While many of the male faculty expressed limited impact on their research and their wishes were primarily related to operational matters such as funding for technicians, graduate students, and accesses to labs/facilities, female faculty shared a broader spectrum of wishes ranging from research operational needs to caregiver supports. The last quote in this section also called on university administration to revisit structural inequities and other equity-related concerns that exacerbated by COVID-19 pandemic.

5 | DISCUSSION

Our data highlight a disproportionate and negative impact on female and racialized faculty in academia. This echoed Petts et al.'s (Petts et al., 2021) conception of “gendered pandemic” where women and racialized faculty in our study reported higher levels of stress, social isolation and lower well-being compared to their men counterparts. These findings extend previous concerning data (Firang, 2020; Metcalfe, 2020) that emphasized the escalated health and social-wellness hardships that academics are experiencing during the pandemic. Our qualitative data shed light on substantial gender inequities where female faculty reported such as increased caregiving burden that affected their research productivity. The most pronounced impacts were felt among non-tenured female faculty.

Our results amplify emerging data for the disproportionate negative affect of the pandemic on women, particularly those in their early careers (Malisch et al., 2020), specifically with respect to increased needs around caregiving (Mason, 2013). A pre-pandemic policy brief reported the contribution to unpaid childcare and domestic work by women outpaced men by 2.4 h daily; women were also overrepresented as caregivers of aging parents and older family members (Cerrato & Cifre, 2018). This impact on women within academia has demonstrated that women faculty face more challenges with establishing a productive work-life balance compared with men (O’Laughlin & Bishoff, 2005). Mason and colleagues describe what they call the “baby penalty”, a phenomenon where family and the associated obligations negatively affect the careers of women differentially from those of men (Mason, 2013). Further, women faculty perform significantly more administrative service than men, arguing that women faculty are shouldering a disproportionately large part of the burden of “taking care of the academic family” (Guarino & Borden, 2017). Our findings echoed such observation in which we found that female faculty demonstrated care about the health and well-being of their graduate students differentially from men. These care-taking behaviors, we argue, reflected marginalized faculty's vulnerability and their sense of the importance of communal support. Unlike one of our male participant's comment “*let us look after ourselves*”, it is clear that institutional change and support are crucial to supporting all members of academic communities regardless of gender, ethnicity, or area of research, Structural gender inequities cut across occupations and caregiving responsibilities impact women workers in all domains. The present study situates differences among women and men, in the realm of the long-existing institutional norms, bias, stereotypes, and power structure (Diprose, 2002; Grosz, 1994). Here, we re-visit Butler's conception of “doing gender” and argue that the current institutional and societal norms on gender and racial differences trap marginalized groups to enact to the prescribed performative acts such as care-giving and being a model citizen. The global pandemic, on the one hand, disrupted the routine in universities. On the other hand, it brought to

the surface these long-existing structural issues in our society. Movements such as Black Lives Matter were visible, powerful, and impactful (Bell et al., 2021).

In planning for post-pandemic recovery, universities should explore new approaches to harness the essential flexibility of a faculty position (where faculty have substantial autonomy with respect to their work schedules) to provide extra, formalized support to female faculty members who have caregiving responsibilities. This could include prioritizing teaching assignments that align with school and daycare hours, and considering the timing of service committees and university events from the perspective of families with children. Formalizing flexibility could both support faculty members who are also caregivers without contributing to a “flexibility stigma” or exacerbating “motherhood wage penalties” (Fuller & Hirsh, 2019).

5.1 | Institutional and organizational change in post-pandemic academy: Some recommendations

Moving forward, the findings of the present study provide an opportunity for researchers, university leaders, and university associations to assess and track equitable distribution of workload and evaluation of performance for male and female. We recommend that universities should move beyond the traditional “publication tracking” metrics to involve a comparative analysis by gender and by racialized status to ensure systemic inequities are identified and considered in tenure and promotion decision. Such measures are particularly important while pandemic-related measures are in-place in Canadian universities, and should take into account the additional burdens faced by these groups in their homes. Quantitative data exclude the importance of context and situatedness. Hence, qualitative data is essential to provide depth to quantitative observations. Ní Laoire et al. (2020) argue for the need to approach organizational change around gender and racial bias within universities dialogically. They note the importance of understanding the organizational context of universities, as “dynamic and relational spaces through which policy ideas are translated and mediated. To enact change within the gendered and racialized structure of the university, there is a need to understand the lived experience of individuals within the organization as part of the transformational process, as opposed to being passive agents who will experience the effects of the change after the fact (Ní Laoire et al., 2021). To address these issues, we believe universities can explore assigning dedicated professionals that faculty can access, who are equipped to provide individualized intervention strategies—we postulate that a ‘one size fits all’ approach will be insufficient.

One way for universities to dialogically implement new policies to support female and racialized faculty both recover from the effects of the pandemic as well as support them within an already-inequitable institution is to prioritize storytelling and narrative alongside metrics and formal policy. Young (2000) conceptualizes narrative as a mode of inclusive communication that can center the experiences of marginalized individuals and create shared understandings within a particular group or association. Narrative, or a process by which individuals engage in sharing their situated experience by way of telling their own stories, can help to dislodge hegemonic viewpoints within a particular group or organization, and can support engagement between individuals who experience organizations or institutions differently or have differing assumptions about what is important (Young, 2000). Storytelling can also support engagement between individuals who have affinities or commonalities with each other, and this can foster community; “narrative exchanges give reflective voice to situated experiences and help affinity groupings give an account of their own individual identities in relation to their social positioning and their affinities with others” (Young, 2000). Recent research by Wagner et al. (2021) supports the use of using the lived experience of marginalized academics to gain insight into privilege and disparity within universities. We urge universities and faculty associations to think of ways to collect and value stories about individual impacts of the pandemic on researchers, and to incorporate an understanding of these real-world impacts into their policies; this might mean that recovery plans are dynamic and fluid, and capable of adapting to the changing circumstances of the professoriate. Encouraging the sharing of experiences in an academic setting might increase a sense of community among female and racialized faculty members

at the same time as providing a way for senior administrators to productively engage with disparities among faculty members in order to decrease inequity.

Labor unions such as faculty associations could also play a critical role in policy advocacy and assessment work to inform policy. In Canada, the Canadian Association of University Teachers (CAUT) surveyed 4300 faculty in the academy across Canada (2020) noting that one third are working an additional 10 h weekly, two thirds of faculty reported reduced research, and 84% are experiencing higher stress due to various demands that included increased teaching, caregiving responsibilities, lack of in-person conferences, and lack of access to labs or offices and job insecurity. Our findings extend the CAUT survey by demonstrating that the health and social wellness of faculty conducting research was magnified among female and racialized faculty. The CAUT has provided recommendations for the university and government for (1) health and safety, (2) workload, (3) job security, and (4) government recommendations. While these recommendations might address some systemic inequities that female and racialized faculty experience, we highlight a call for action and underscore the critical need for recommendations for the university to specifically address these pandemic-exacerbated systemic inequities that female and racialized faculty have experienced. It is important to understand gender and racial inequities did not originate and are not limited to the university setting. Marginalized populations are constantly experiencing stereotypes and systemic discrimination in their everyday life and in multiple institutional settings. It is crucial to assess and evaluate the impact of such inequitable settings collaboratively with faculty, universities, and other stakeholders beyond the academy to mitigate systemic inequities. Building on these suggested actions, we suggest collective action and organization responsibility of the university and related unions be considered over individual responses.

To better assess and evaluate our present pandemic response and to establish efforts to address future disruptive events, we recommend the regular monitoring of health and social-wellness. The analysis and tracking of these data such that those not doing well can be identified for active intervention, similar to an early alert system for students.

6 | CONCLUSION

One of the touted early stories of the COVID-19 pandemic was the argument that it is a leveler, ignoring social status, ethnic status, or gender-identity. This study presents data on how critically incorrect this initial postulation was. Female and racialized faculty experienced a higher proportion of negative health and social well-being impacts that negatively impacted their research and/or research networks (i.e., trainees). Our data highlight an opportunity—a time for change, honest conversations to reduce systemic inequities further exacerbated by the pandemic. Equitable and diverse collaboration is essential for bringing together collective ideas of faculty, university leaders with the support of faculty associations and unions that have tools already in place to extend reach (Malisch et al., 2020).

This study has the following limitations. The mode of data collection for the qualitative component of the study was via long-answer survey questions. Interviews could have provided more richness in the data. We sampled faculty via direct emails to all public Canadian universities as well as snowball sampling via social media platforms (i.e., Twitter, Facebook). Snowball sampling is difficult to track and the reach is less controlled. This sample may not represent all faculty employed by public Canadian universities and will be subject to selection bias. Based on response rates by University and Province, our sample did not demonstrate significant selection bias by minority status or gender. This study represents a nation-wide case study of faculty employed at public Canadian universities. It may not be generalizable to the experience of faculty working outside Canada, non-tenure track faculty and faculty working for private institutions. This survey was administered in the summer after the onset of the pandemic. It may under-estimate and did not attempt to assess chronic health and social well-being impacts resulting from the pandemic. Lastly, this study focused solely on public Canadian universities. Public and private universities in Canada have largely different private, provincial and federal funding and governance structures. We acknowledge both are important to study, but due to these differences in funding and governance structures, we recommend future work study them distinctly.

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CONFLICT OF INTEREST

All authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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