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Changes in Working Women's Self-Reported Subjective Wellbeing and Quality of Interpersonal Relationships During COVID-19: A Quantitative Comparison of Essential and Non-essential Workers in Singapore

Poh Lin Tan PhD^{1†}  and Jeremy Lim-Soh PhD^{2*†} 

¹Lee Kuan Yew School of Public Policy, National University of Singapore and ²Centre for Ageing Research and Education, Duke-NUS Medical School, National University of Singapore

*Corresponding author: email: jeremy@duke-nus.edu.sg

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Abstract

The COVID-19 pandemic has affected working women's well-being in different ways due to contrasting national responses. This article focuses on the specific context of Singapore, which implemented differentiated rules for workers: essential workers continued to report to work-places, while non-essential workers were required to work from home. This policy had far-reaching implications for working women, who are more likely than husbands to juggle paid work and household duties. The article uses longitudinal data collected in 2018 and during the pandemic in 2020, specifically during Singapore's lockdown period, to measure changes in 287 working women's self-reported levels of stress, fatigue, and quality of interpersonal relationships by essential worker status. While all workers were affected by the pandemic, female essential workers were more likely than their non-essential peers to report declines in stress levels from 2018 to 2020, and less likely to report changes in spousal relationships, both positive and negative. Findings suggest that the differences were driven by exposure to quarantine conditions faced by non-essential workers. Our results highlight the importance of policies supporting frontline workers and more gender-equitable labour market policies to support married women juggling the twin demands of employment and household responsibilities.

Keywords: COVID-19; essential workers; subjective wellbeing; interpersonal relationships

1. Introduction

The COVID-19 pandemic has led to an unprecedented crisis for working women, but no global consensus on the effects regarding various aspects of their well-being has emerged due to differing national responses and effectiveness of public health

[†]These authors contributed equally to this work.

messaging and management, ranging from a sudden and drastic lockdown in the case of India (Dutta and Fischer, 2020) and extensive use of contact tracing in South Korea (Lee and Choi, 2020) to the use of COVID-19 tests among specific groups of essential workers in the UK (Yoo et al., 2020).

This article focuses on the impact on working women's subjective wellbeing and interpersonal relationships in the specific context of Singapore, an Asian city-state. Evidence from less-studied regions is especially important to include, given that effects on households globally have been far from uniform. For example, while women are generally more likely to become unemployed or reduce work hours following a lockdown, the gender gaps in employment outcomes appeared to be smaller for Germany and Singapore compared to the US (Reichelt et al., 2021). Given the heterogeneity in pre-existing social and economic structures, exposure and national responses to COVID-19, our evidence helps to provide a more complete picture of how working women have been impacted worldwide.

As in many other countries, Singapore instituted a lockdown to slow infections, locally known as a "circuit breaker". However, its lockdown was comparatively short and strict, while restrictions were more gradually phased out (Ritchie et al., 2020). Singapore also implemented differentiated rules for essential and non-essential workers during this period: non-essential workers were required by law to work from home, whereas essential workers in healthcare, logistics, and other industries had to continue reporting to their workplaces. By comparing the experiences of working women in essential and non-essential jobs in the context of Singapore's experience, the analysis highlights the importance of social policies that support vulnerable frontline workers, as well as the need for more gender-equitable labour market policies to support married women in juggling the twin demands of employment and household duties, at a time when mental health is increasingly considered critical (Bao et al., 2020; Hammonds et al., 2020; Fisher, 2022).

We consider changes in working women's wellbeing along two dimensions: subjective wellbeing, measured by stress and fatigue, and quality of interpersonal relationships. We compare the results for women working in essential and non-essential jobs and consider three mechanisms for differential outcomes: i) perceived risks of infection and anxiety surrounding the coronavirus, ii) income loss, and iii) exposure to quarantine conditions. A heterogeneity analysis by household income is also conducted to investigate the extent to which results differ by access to resources.

2. Singapore's Covid-19 policy responses

Singapore confirmed its first case of coronavirus infection on 23 January 2020. Following a surge in cases, the government enacted a lockdown between 7 April and 1 June 2020. Eating places were closed and residents were only allowed to leave home to buy necessities and exercise. Schools were also closed with instructions for home-based learning. Workers in non-essential jobs were required to work from home, while essential workers in healthcare, logistics, and other industries had to continue reporting to their workplaces.

Compared to Western countries, Singapore's Covid lockdown was short but strictly enforced. The reduction in Singapore's workplace traffic (70%) was similar

to the UK but greater than Germany and the US (50%); additionally, Singapore's lockdown reduced park visitors by 60%, in contrast to rising numbers in the US, the UK, and Germany (Ritchie et al., 2020). The combination of this restrictive lockdown as well as stringent international travel restrictions allowed Singapore to keep its cases low for over a year and gradually ease restrictions, while some Western countries had to return to full lockdown (Ong, 2020; Ritchie et al., 2020).

Concurrently, the Singapore government rolled out SGD 60 billion (USD 42 billion) of financial support for the economy in early 2020, amounting to 12% of GDP, which was comparable to the spending of other developed countries (BBC, 2020; Tang, 2020). More than SGD 7 billion was earmarked for the Jobs Support Scheme, which subsidised up to 75% of employees' wages during the lockdown, while self-employed workers received up to SGD 1,000 per month (Co, 2020). These measures alleviated the impact of the pandemic on the mental health of vulnerable groups such as low-income mothers (E. C. L. Goh et al., 2022).

Importantly, Singapore's national response to COVID-19 was preceded by experience against the 2003 SARS crisis, which allowed the city-state to build up capacity for contact tracing (Woo, 2020). Moreover, its public health emergency preparedness allowed frontline workers to receive up-to-date information on virus hotspots and adequate training in the use of protective equipment, which helped to moderate anxiety (S. S. N. Goh and Chia, 2020). There were also efforts to provide financial and moral support to essential workers, resulting in lower stress in the healthcare sector compared to previous disease outbreaks (B. Y. Q. Tan et al. 2020).

By contrast, non-essential workers, particularly working women, faced less assistance with the sudden switch to work-from-home arrangements during the lockdown, resulting in worsening of subjective wellbeing and interpersonal relationships. In Singapore, 61% of those working from home reported feeling stressed, compared to only 53% of front-line workers (Teo, 2020). Wives were more likely to report worsened spousal relationships if they worked from home during the lockdown; this could have been related to the traditional gender roles of Singaporean women as primary caregivers to children and the elderly (Jones, 2012; Lim-Soh and P. L. Tan, 2022). Moreover, as Singapore is the second most densely populated country in the world, lockdown-related mental health effects may have been amplified by high household density (Groot et al., 2022).

3. Subjective wellbeing and interpersonal relationships of working women

3.1 Worker wellbeing and working conditions

A lack of control over one's work leads to stress, poor mental health and burnout, which may affect essential workers more due to nonstandard work schedules (Zhao et al., 2021). Stress caused by tensions at the workplace, in turn, can strain interpersonal relationships at home (Story and Repetti, 2006). During the pandemic, essential workers around the world generally reported worse mental health outcomes and wellbeing relative to the general population, due to fears of Covid-19 exposure, increased workload, and lack of public recognition and support (Bu et al., 2022; Bell et al., 2021; Hammonds et al., 2020; Kinsella et al., 2022; May et al., 2021;

Wu et al., 2020). However, one study found that the opposite was true for healthcare workers in Australia, highlighting the importance of institutional context (Toh et al., 2021).

The consequences of the pandemic were also gendered, with the mental health of women deteriorating more than that of men (Pierce et al., 2020). This is partly because the challenges of balancing work and family life were particularly acute for working women, who were likely to bear the brunt of the unpaid work burden during the pandemic due to gender norms surrounding the household division of labour, especially in less gender-egalitarian settings (Craig and Churchill, 2021). For example, in the UK, reduced working time and furlough improved male workers' mental health but failed to help female workers, due to the increase in women's domestic duties (Adisa et al., 2021; Wang et al., 2022). In one of the few non-Western studies, traditional gender norms contributed significantly to women being unable to separate work and family commitments in Bangladesh (Uddin, 2021).

3.2 Mechanisms and moderators of worker wellbeing

To better understand the differential impacts of the COVID-19 lockdown on female essential and non-essential workers, we focus on three potential mechanisms – risk perceptions, income loss, and exposure to quarantine conditions. We focus on these three mechanisms to reflect the holistic nature of the crisis, which encompasses health, economic, and social stressors, while acknowledging that this list is not comprehensive and that other factors such as job role, which are not available in our dataset, could also be important (Denning et al., 2021).

First, risk perceptions regarding the pandemic were generally high in Asian populations, with 25% of Hong Kongers reporting worsened mental health during the pandemic, partly due to worries of infection and insufficient surgical masks, and 71% of Singaporeans stating that they were somewhat or very worried about contracting COVID-19 during the lockdown (Choi et al., 2020; Ipsos, 2020). These concerns may have been elevated among essential workers, especially healthcare workers who had higher exposure and poorer sleep quality than the general population (Bao et al., 2020; Huang and Zhao, 2020).

Second, income loss during the lockdown was a potential driver of stress and adverse changes in family relationships. Mental stress is related to families' subjective views of their job security, and economic strain is associated with cooler marital interactions, lower relationship satisfaction, and hostility toward children (Falconier and Epstein, 2010; Sverke and Hellgren, 2002). Individuals who suffered income loss during the pandemic were found to be at higher risk of poor mental health in China (Li et al., 2020). Essential workers in industries such as food and beverage and private-hire drivers are vulnerable to pandemic-related disruptions, whereas essential services such as healthcare and communications are in higher demand and less vulnerable to loss of employment (Helppie-McFall and Hsu, 2020; Parks et al., 2020).

The third mechanism we examine is exposure to quarantine conditions, which were designed to reduce infection risks but can be detrimental to mental health. The lockdown in Spain led to a decline in psychological well-being, while Americans suffered greater health anxiety, financial worry, and loneliness under stay-at-home

orders (Aymerich-Franch, 2020; Tull et al., 2020). Over half of survey respondents in Singapore reported lower levels of physical activities and feeling down some or all of the time during the lockdown (Ipsos, 2020), while another local survey found that over 70% of individuals working from home reported higher levels of stress and longer work hours (Yang, 2020). Working women in non-essential jobs may have been disproportionately affected, with any hours saved by telecommuting more likely to be repurposed for caregiving or housework rather than contributing to leisure, especially if schools and child-care centres were closed (Fuller and Qian, 2021; Oehrli et al., 2022). Telecommuting allows for more interpersonal interaction but is potentially frustrating for dual-income couples who need to stay productive, a problem that can be compounded by residential crowding in densely populated cities (Prime et al., 2020).

Working from home can also have repercussions on interpersonal relationships by collapsing the spatial boundaries between home and work (Graham et al., 2021; Halford, 2006). The disruption to employment, education, and leisure schedules may be a catalyst for renewed intimacy and solidarity, but may also spark conflict between family members in crowded spaces (Günther-Bel et al., 2020). Findings from Spain suggest that intimate partner violence became more prevalent during pandemic lockdowns (Arenas-Arroyo et al., 2021); similarly, Singapore saw a surge in domestic abuse cases and calls for help regarding family violence during the lockdown (Iau, 2020).

Lastly, socioeconomic status is likely to be an important moderator of changes in women's psychological health and interpersonal relationships during the pandemic due to its effects on mental well-being and interpersonal relationships (Chen et al., 2020; Young, 2022). Low socioeconomic status may also increase disease risk through stress-related mechanisms, while economic and social capital have interaction effects on health (Adler et al., 1994; Ahnquist et al., 2012).

4. Data and methods

4.1 Sample

The first wave of data was collected between April and July 2018. 660 women were recruited using street intercept at public spaces such as metro stations and mall entrances at the five main geographical regions of Singapore (Central, East, North, Northeast and West) according to the following inclusion criteria: currently married; aged 25-34 in 2018; either a Singaporean citizen or married to a Singaporean citizen, and able to read, write and speak in English. Of 3,038 potential participants approached, 660 (22%) were recruited, 561 (19%) did not meet the criteria, and 1,820 (60%) declined. All interviews were conducted face-to-face in English. Each recruited participant received SGD 20 (USD 15) for participating in the first wave. Of 657 participants, 500 consented to be re-contacted and 416 (83%) subsequently completed a follow-up online survey in May 2020 during the lockdown. For the purposes of this article, only married couples who were both working during the lockdown are included to compare the experiences of female essential and non-essential workers. The final sample size was 287. The study was approved by the National University of Singapore Institutional Review Board.

4.2 Measures

The key dependent variables are married women's self-reported changes in stress, fatigue, and interpersonal relationships. Stress and fatigue were measured on a five-point Likert scale ranging from "not at all" to "very", with any change from 2018 to 2020 coded as increased, no change, or reduced. Single-item measures for all three variables demonstrate similar reliability as multi-item scales and may be appropriate in shorter surveys (Fülöp et al., 2022; Littman et al., 2006; van Hooff et al., 2007). Data on changes in interpersonal relationships during the lockdown were collected in 2020 using the following question: "How has your relationship with the following people been affected by the circuit breaker?" with regard to the following groups: a) the husband, b) children as a group, c) friends as a group, and d) colleagues as a group. Responses were recorded on a five-point Likert scale ranging from "much worse" to "much better" and recoded into three categories: improved, no change, and worsened.

The main independent variables of interest are both spouses' self-reported essential worker status during the May 2020 lockdown, measured as binary variables. In the Singaporean context, essential services included hospitals and clinics, community care, medical supporting services, food supply, food outlets, food delivery, hotels, online retail, hairdressing, opticians, household services, vehicle recovery and repair, hardware stores, electronics repair, laundry, veterinary, continuing education, pet supplies, transport, shipping, monetary, banking and insurance (The Straits Times, 2020).

Infection risk perceptions were measured using two variables collected in 2020. Respondents' perception of COVID-19 infection risk to themselves was measured as a percentage from 0-100 by asking, "To the best of your ability, estimate the probability that you will be infected by the coronavirus", while anxiety about getting infected with COVID-19 was measured on a five-point Likert scale ranging from "not at all" to "very". Data on income in December 2019 and May 2020 was collected retrospectively for both spouses in additional surveys in June and November 2020, and measured in brackets from 2 to 12 (2 = monthly income less than SGD 1,000 and 12 = monthly income SGD 10,000 or more). Income loss for each spouse was defined as a binary variable equal to one if his or her income shifted to a lower bracket between December 2019 and May 2020. Exposure to quarantine conditions was measured with a binary variable equal to one if the respondent or spouse was working "only from home" during the May 2020 lockdown. We measured exposure to quarantine conditions separately from essential worker status because the two were not equivalent: while essential workers were permitted to work outside the home, some could have switched to working partly or fully from home if the nature of their job allowed for it; conversely, workers in non-essential services were able to apply for short-term exemptions from quarantine under certain circumstances (Seah, 2020). The exact wording of questions is provided in the Appendix.

The following variables are controlled for: both spouses' age, education, and income levels, number of years married, number of children, and wife's ethnicity, as of May 2020. Education was coded as a binary variable equal to one if he or she has a college degree. Wife's ethnicity was coded as a binary variable equal to one if she is Chinese, the majority ethnic group in Singapore.

4.3 Analytic Plan

Descriptive statistics are computed for all variables using three categories: families with no essential workers, families where the wife was an essential worker, and families where the husband was an essential worker. To test for differentials in outcomes, a multinomial logistic regression model is used, which allows for more flexible, non-linear statistical relationships. Heterogeneity analysis is conducted for changes in women's stress, fatigue, and family relationships by household income, with respondents divided into two groups based on median values. The first group includes income categories with a midpoint below SGD 9,000, and the second group includes income categories with a midpoint of SGD 9,000 or higher. We also consider the case where both spouses were essential workers using an interaction term for both spouses' essential worker status.

All regressions include the full set of controls. Estimates are adjusted using pseudo sample weights applied to the subset of respondents who completed the online survey in May 2020 with respect to the age, racial and educational distributions of married female residents in this age range, based on published statistics from the 2015 General Household Survey conducted by the Singapore Department of Statistics. Nevertheless, the results apply only to married couples who were both working during the lockdown. Results with a p-value smaller than 0.05 are considered statistically significant.

5. Results

5.1 Descriptive

Table 1 displays descriptive statistics by the essential worker status of both spouses. The proportions reporting an increase in stress were similar for all groups, ranging from 32% to 34%. Compared to working women in families without essential workers, higher proportions of female essential workers and women married to essential workers reported a decline in stress levels relative to 2018 (38% and 33%, compared to 22%). On the other hand, lower proportions reported a decline in fatigue levels (24% and 22%, compared to 32%) and higher proportions reported an increase (32% and 33%, compared to 22%), relative to 2018. It is important to note that the figures in Table 1 include survey year-specific changes that make direct interpretation more difficult, since counterfactual figures in the absence of the pandemic are unknown. To address this, the regression model compares changes in subjective wellbeing relative to other groups over the same period.

In terms of interpersonal relationships, female essential workers and women whose husbands were essential workers were approximately half as likely to perceive changes in spousal relationships (between 25% and 30%) relative to before the lockdown, whether negative or positive, compared to over 60% of women in families without essential workers. Moreover, the former groups were slightly more likely to indicate improved (16%) than worsened (12-14%) relationships, whereas the latter saw an even balance between improved (32%) and worsened relationships (32%).

The table further shows that female essential workers and those married to essential workers reported only slightly higher perceptions of COVID-19 infection risk (25% and 26%), compared to those in families without essential workers (24%).

Table 1. Summary statistics for 287 dual-income families (Mean and Linearised SE)

	No essential workers (N = 109)	Wife is essential worker (N = 117)	Husband is essential worker (N = 140)
Dependent variables			
Wife's stress reduced (%)	21.66	38.23	33.33
Wife's stress increased (%)	34.02	32.04	32.47
Wife's fatigue reduced (%)	31.94	23.84	22.05
Wife's fatigue increased (%)	22.15	32.31	33.08
Relationship with husband worsened (%)	32.04	11.93	13.66
Relationship with husband improved (%)	31.72	15.75	16.05
Relationship with children worsened (%)	8.92	12.22	11.13
Relationship with children improved (%)	59.61	46.76	50.73
Relationship with friends worsened (%)	6.75	7.82	8.50
Relationship with friends improved (%)	8.39	5.29	6.40
Relationship with colleagues worsened (%)	20.19	5.54	6.72
Relationship with colleagues improved (%)	5.73	10.16	7.61
Independent variables			
Wife's perception of COVID infection risk to self (scale of 0-100)	23.96 (3.77)	25.14 (4.94)	26.27 (4.42)
Wife's anxiety about getting infected with COVID (scale of 1-5)	3.15 (0.14)	3.26 (0.22)	3.27 (0.20)
Wife had income loss since Dec 2019 (%)	6.20 (0.02)	12.35 (0.04)	8.92 (0.04)
Husband had income loss since Dec 2019 (%)	14.95 (0.05)	9.57 (0.04)	13.72 (0.04)
Wife works from home (%)	90.21 (0.03)	17.13 (0.04)	34.23 (0.06)
Husband works from home (%)	71.96 (0.09)	23.85 (0.05)	11.09 (0.04)
Controls			
Wife's age	33.32 (0.41)	32.9 (0.49)	32.99 (0.43)
Husband's age	36.57 (0.57)	36.1 (0.62)	36.14 (0.55)
Wife has degree (%)	74.85 (0.06)	48.32 (0.08)	48.44 (0.08)

(Continued)

Table 1. (Continued)

	No essential workers (N = 109)	Wife is essential worker (N = 117)	Husband is essential worker (N = 140)
Husband has degree (%)	55.45 (0.09)	37.24 (0.07)	32.01 (0.05)
Wife's income bracket (scale of 2 to 12)	6.08 (0.33)	5.18 (0.22)	5.17 (0.19)
Husband's income bracket (scale of 2 to 12)	6.62 (0.31)	6.14 (0.26)	6.09 (0.22)
Years married	6.74 (0.44)	6.64 (0.32)	6.89 (0.33)
No. of children	1.30 (0.10)	1.73 (0.25)	1.79 (0.23)
Wife is Chinese (%)	71.28 (0.10)	63.32 (0.10)	68.33 (0.09)

Notes: Estimates adjusted for sample weights based on the survey, which includes non-working individuals. All variables measured as of May 2020.

Likewise, they were slightly more anxious about getting infected (3.26 and 3.27) than non-essential worker households (3.15). On the other hand, female essential workers were twice as likely to suffer income loss (12%, compared to 6% among working women in families without essential workers) and much less likely to be working only from home (17%) compared to 90% of women in families without essential workers.

5.2 Multivariate

Table 2 displays the results of the multinomial logit regressions which test for differences in working women's self-reported stress and fatigue by essential worker status, controlling for background characteristics. Consistent with Table 1, female essential workers were more likely than their non-essential counterparts to report a decline in stress levels between 2018 and 2020 ($p < 0.05$). However, there was no significant relative difference by essential worker status for fatigue. Compared to their non-essential counterparts, female essential workers were also less likely to perceive changes in spousal relationships, whether negative ($p < 0.01$) or positive ($p < 0.05$). The coefficients of husband's essential worker status were insignificant for all columns at the 5% level.

Next, potential mechanisms behind the differential outcomes are investigated (Table 3). Female workers with higher perceptions of infection risk were more likely to report relatively worsened spousal relationships ($p < 0.05$). However, because working women in families with essential workers reported only slightly higher perceptions of risk than those in households without essential workers (Table 1), this mechanism is unlikely to be the main driver of differential relationship outcomes.

Women who experienced income loss were less likely to report increased stress ($p < 0.01$), but also more likely to report increased fatigue ($p < 0.05$). Since female essential workers were more likely to report income loss than their peers (Table 1), income loss helps to explain the results in Table 2, which show that female essential

Table 2. Multinomial logit regressions on change in wife’s stress, fatigue and spousal relationship

	Stress		Fatigue		Spousal relationship	
	Reduced	Increased	Reduced	Increased	Worsened	Improved
	(1)		(2)		(3)	
Wife is essential worker	0.890* (0.428)	0.232 (0.439)	0.138 (0.445)	0.179 (0.418)	-1.375** (0.519)	-0.810* (0.390)
Husband is essential worker	-0.031 (0.397)	0.328 (0.458)	-0.460 (0.417)	0.309 (0.420)	-0.684 (0.468)	-0.716† (0.377)
Wife’s age	0.075 (0.122)	-0.127 (0.087)	-0.133 (0.129)	-0.060 (0.131)	-0.122 (0.115)	-0.112 (0.092)
Husband’s age	-0.135* (0.065)	-0.026 (0.062)	-0.049 (0.066)	-0.125 (0.088)	0.178† (0.091)	-0.011 (0.056)
Wife has degree	-0.784 (0.605)	-0.270 (0.503)	0.588 (0.619)	0.265 (0.548)	0.038 (0.524)	-0.965† (0.522)
Husband has degree	-0.259 (0.500)	0.192 (0.547)	-0.289 (0.526)	0.607 (0.531)	-0.091 (0.596)	0.398 (0.472)
Wife’s income	0.069 (0.106)	0.039 (0.122)	-0.069 (0.126)	-0.017 (0.100)	0.025 (0.124)	0.170 (0.117)
Husband’s income	0.135 (0.111)	0.131 (0.111)	-0.173 (0.112)	-0.225* (0.092)	-0.150 (0.133)	-0.075 (0.092)
Years married	-0.078 (0.106)	-0.094 (0.101)	0.053 (0.107)	-0.031 (0.120)	-0.039 (0.132)	0.053 (0.092)
No. of children	0.009 (0.252)	-0.389 (0.274)	-0.124 (0.211)	-0.007 (0.348)	-0.116 (0.248)	-0.395* (0.197)
Wife is Chinese	-0.074 (0.730)	-0.598 (0.650)	0.432 (0.726)	0.506 (0.755)	-1.224† (0.694)	-0.012 (0.721)
Observations:	287		287		287	
Pseudo-R ² :	.09		.07		.15	

Note: Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. Constant not shown.

workers were more likely to report declined stress than their non-essential counterparts. The regression results further show that husbands’ income loss was also associated with changes in stress levels (p < 0.05). However, this variable is likely to be much less important given the similar rates of income loss reported by women in families with male essential workers and those without essential workers.

Lastly, women who worked from home were less likely to report declines (p < 0.01) in stress, and more likely to report worsened spousal relationships (p < 0.01), relative to those who worked outside. This suggests that work from home status helps to explain differential outcomes in stress and relationships, given that most essential workers were not working from home. Although having a husband who worked from home was associated with a relative decline in fatigue (p < 0.05)

Table 3. Multinomial logit regressions on change in wife's stress, fatigue and spousal relationship, with mechanisms

	Stress		Fatigue		Spousal relationship	
	Reduced	Increased	Reduced	Increased	Worsened	Improved
	(1)		(2)		(3)	
Wife's perception of infection risk	0.007 (0.009)	0.001 (0.010)	-0.010 (0.010)	-0.019 (0.011)	0.022* (0.011)	0.008 (0.009)
Wife's anxiety about getting infected	0.138 (0.197)	0.109 (0.180)	0.048 (0.185)	-0.032 (0.166)	0.096 (0.202)	0.125 (0.150)
Wife had income loss	-0.548 (0.694)	-1.963** (0.717)	0.783 (0.729)	1.466* (0.653)	-1.212 (0.802)	-0.833 (0.663)
Husband had income loss	1.327* (0.649)	1.556* (0.600)	0.014 (0.655)	-1.111 (0.747)	0.920 (0.660)	0.084 (0.520)
Wife works from home	-1.341** (0.463)	-0.858† (0.467)	-0.076 (0.506)	-0.230 (0.479)	1.700** (0.577)	0.402 (0.391)
Husband works from home	0.619 (0.490)	0.630 (0.504)	0.918* (0.441)	0.046 (0.407)	0.186 (0.514)	1.229** (0.406)
Observations:	287		287		287	
Pseudo-R ² :	.14		.10		.17	

Note: Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$. Constant and controls not shown.

and improved spousal relationships ($p < 0.01$), husband's essential worker status was not a statistically significant predictor.

In further analysis, the associations between wife's essential worker status and changes in relationships with children, friends and colleagues are explored, but no significant differentials are found (Tables A1 and A2 of the appendix). The main analysis is also repeated by household income. Columns (2) of Tables A3 and A4 show that among higher income households, female essential workers were more likely to report reduced stress and fatigue compared to their non-essential worker counterparts ($p < 0.05$). The coefficients are smaller and non-significant among the lower income group. On the other hand, Column (1) of Table A5 shows that, in the lower income group, female essential workers were less likely to report worsened spousal relationships ($p < 0.01$) than their non-essential counterparts. The coefficient is smaller and insignificant at the 5% level for the higher income group. Finally, the main analysis is repeated with an interaction term for wife and husband's essential worker status, to test if families in which both spouses are essential workers were exceptionally affected by the crisis; no evidence was found of interaction effects (Table A6).

6. Discussion

This paper explores the association between essential worker status and changes in three dimensions of working women's well-being during the height of the

pandemic. Female essential workers were more likely to report reduced levels of stress from 2018 to 2020, relative to non-essential workers. This is not to say that female essential workers as a group were not affected by the pandemic – indeed, around one-third of all respondents reported increases in stress levels and a third of female essential workers also reported increased fatigue compared to pre-pandemic levels. Instead, the regression analysis, which compares changes in well-being across groups over the same period, indicates that female essential workers were more likely to report improvements in stress and less likely to report improved or worsened relationships with husbands than their non-essential peers. Outcomes were not strongly associated with husband's essential worker status, suggesting that spill-over effects from spouses' essential work status are relatively weak. Highlighting the importance of national context, the findings contrast with reports from China and the US, which found that essential workers were stressed and overworked (Hammonds et al., 2020; Wu et al., 2020).

6.1 Mechanisms

The differences in perceptions of infection risk and anxiety about getting infected between female essential and non-essential workers were small, unlike in the US, where essential workers were more concerned about not having sufficient access to protective gear (Hammonds et al., 2020). Hence, while perceived infection risks were associated with worsened relationships with husbands, the similarity in perceived risk and anxiety levels by essential worker status reduced the role of this factor as a driver of differential outcomes.

Women's income loss was associated with a lower likelihood of increased stress but higher likelihood of increased fatigue, possibly due to more time spent on unpaid domestic labour as mothers were more likely to put in additional childcare hours in relation to school closures (Sevilla and Smith, 2020). Since female essential workers were more likely to report income loss, this mechanism helps to explain the observed outcomes. Here, another important contextual factor is the availability of income support during the crisis.

Exposure to quarantine conditions also helped to explain differential outcomes by essential worker status, since women who worked from home were less likely to report a decline in stress levels during the lockdown. Our findings are consistent with literature on gender inequalities in household responsibilities and women's mental health during the pandemic, and the psychological impact of being confined to the home with limited physical activity (Aymerich-Franch, 2020; Czymara et al., 2021; Ipsos, 2020).

We also find that women were more likely to experience worsened spousal relationships if they were working from home, but more likely to experience improved spousal relationships and lower fatigue if their husband was working from home. Given the traditional gender roles of Singaporean women as primary caregivers to children and the elderly, women working from home might have had to shoulder the bulk of household and childcare responsibilities (Calarco et al., 2021; Jones, 2012). On the other hand, husbands working from home might have helped to relieve some of that burden, given the connections between paternity leave and family stability (Chung et al., 2021; Petts et al., 2020). Hence, working from home can be

a double-edged sword, allowing for greater family engagement but also creating potential conflict zones for the household division of labour and compromising women's ability to relax after formal work hours (Graham et al., 2021; Halford, 2006; Wapshott and Mallett, 2012).

6.2 Moderating effects of income inequality

Heterogeneity analysis shows that female essential workers were more likely to experience reductions in stress and fatigue than non-essential workers, but only among households with above-median income levels. This points to the vulnerability of poorer socioeconomic groups in a pandemic setting and the challenges of balancing work commitments and family life faced by lowly paid female workers (Galea and Abdalla, 2020). A key difference may be the income security and benefits that can be tapped on by workers in high-income professional occupations such as mandatory leave and remote working opportunities, versus the few protections available to self-employed or informal workers in the gig economy (Prassl, 2018). Yet interestingly, we do not find that lower stress and fatigue among higher income households necessarily translates to better relationships – indeed lower-income essential workers were relatively more protected from deteriorations in family relationships.

6.3 Limitations and directions for future research

One important limitation of the study is that data were collected only from women, preventing comparison with husbands' responses or between female and male workers. Moreover, the age range of respondents is relatively narrow, as the initial goal was to study childbearing decisions among married women around the median age at first birth. Consequently, the analysis is most pertinent to married mothers of young children, a group which is likely to be especially vulnerable to changes enacted during COVID-19 lockdowns. Third, the survey did not measure employment-related factors including job seniority and firm size, as well as family-related factors such as the presence of older adults in need of caregiving, both of which were likely to have gendered impacts on worker well-being (Peck, 2021). Finally, the study did not distinguish between various degrees of income loss, which can range from very large in the case of job loss to more minor declines.

Following these limitations, future studies may explore whether these results can be extrapolated to a more diverse sample, including men and workers from a wider age range, as well as explore a wider range of mechanisms such as job role and work hours. Qualitative and mixed methods studies are needed to provide more direct evidence for the impact of social policies aimed at supporting vulnerable frontline workers. Moreover, a more detailed individual-level study (on whether flexible work entitlements during the pandemic helped working women to manage the twin demands of paid work and household duties) can inform more gender-responsive labour market policies, especially in conservative Asian societies.

6.4 Conclusion and implications for policy

While a third of Singaporean female workers in dual-earner families reported increased stress during the strict COVID-19 lockdown relative to before the pandemic, female essential workers were more likely than their non-essential peers to experience declines in stress levels and less likely to experience changes in spousal relationships, pointing to the short-term resilience of female essential workers and their families in the face of crisis (Masten, 2001; Walsh, 2020). This is not to say that essential workers were not affected by the pandemic, but that essential and non-essential workers faced distinctly different challenges, with female non-essential workers bearing a dual burden of managing professional and family life within the confines of the home.

Our finding that essential workers in Singapore did not experience a relative deterioration in subjective wellbeing compared to their non-essential counterparts highlights the welfare implications of public health emergency preparedness and capacity building as well as overt policies that extend financial and moral support to these workers in a time of need. Our finding that frontline workers perceived only slightly higher infection risks points to the benefits of building trust in public health systems. Government-led gestures of goodwill and national gratitude also play an important part considering the harassment and aggression that some of these workers may face in the course of their duties to enforce safe distancing rules (Hammonds et al., 2020), and are likely to receive public support given their crucial contributions to the community (Gandenberger et al. 2022).

By comparison, the relative lack of support for non-essential workers, particularly women who were suddenly saddled with additional housework and childcare demands while continuing to work full-time, resulted in relatively poor subjective wellbeing and less stable interpersonal relationships. The finding that exposure to quarantine conditions helps to explain differentials in stress, fatigue, and relationships is in line with a growing body of research showing that managing the boundaries between work and family life continues to be a serious challenge for families during the pandemic, especially for women who engage in significant unpaid care work (Uddin, 2021; Vaziri et al., 2020). In addition, heterogeneity analysis reveals underlying fault lines that may be exacerbated in the post-pandemic society (Galea and Abdalla, 2020).

While COVID-19 lockdowns have been lifted in many parts of the world, working women continue to face extraordinary challenges balancing work and family life. Female workers are at the centre of this crisis due to their over-representation in essential industries such as childcare and nursing, as well as their prominent role in family life. It is imperative that governments continue to provide essential workers with adequate protective equipment, transparent information, and mental health support to prevent adverse effects on their personal and family lives. At the same time, quarantine and safe distancing measures must take into account the needs of dual-income couples with young children, such as home-based learning and access to informal childcare assistance from relatives. Beyond provisions for reducing work hours and furlough, which have been shown to be more protective of men's than women's mental health in the UK (Wang et al., 2022), social policies should ultimately seek to incentivise more equal distributions of unpaid household labour,

especially in societies where women's work-life balance is precarious, in order to protect women's access to full participation in the labour market, through and after the crisis.

Data Availability Statement. The data underlying this article cannot be shared publicly due to restrictions on use of collected data under the IRB protocol. The data will be shared on reasonable request to the corresponding author.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/S0047279423000016>

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