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Nuclearization of maternal support networks in the UK and the US during the COVID-19 pandemic: Impact on women's financial and emotional wellbeing

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ABSTRACT

The social isolation resulting from governments' responses to the COVID-19 pandemic likely limited support available to mothers. Evidence suggests tasks like childcare and domestic work fell disproportionately on mothers during the pandemic, with consequences for their wellbeing. We explore how the pandemic affected emotional and practical support available to mothers between March and August 2020 and whether changes in support are associated with changes in their paid work and mental health. Data were collected in August 2020 from 1528 UK and US mothers with at least one child under 5-years using a cross-sectional survey and are analysed using regression models. Women's in-person contact with support networks decreased, while virtual interactions increased. Most mothers experienced a 'nuclearization' of in-person support: childcare from fathers and siblings increased or remained constant but decreased from the grandparental generation. Women receiving less support during the pandemic had higher odds of reducing participation in paid work. Associations between support and mental health are limited. We also identify women who concurrently experienced reduced support and increased need for help, representing a particularly vulnerable group. The nuclearization of maternal social networks likely increased physical and emotional pressures on the immediate family, risking parental burnout and affecting reductions in female participation in paid labour. There is a need for reliable and affordable childcare options that help reduce women's burden of unpaid care labour, allowing them to re-enter (or remain in) paid labour.

1. Introduction

Mothers regularly rely on several different sources of support to raise their children, including paid and unpaid help as well as government-provided or subsidised support, which allows them to engage in activities like participating in the labour market (Bick, 2016; Landivar, 2017; Lyonette et al., 2011). In high income contexts, such as the UK and the US, paid and state-provided support can include babysitters, nannies and day-cares; as well as schools for older children which, alongside

education and socialisation, offer childminding (Allen, 2003; Emmott & Page, 2019). Unpaid childcare is often accessed from family members such as mothers' partners, parents, or parents-in-law (Kanji, 2018; Sadruddin et al., 2019; Sear & Coall, 2011). All such sources of support were affected by the onset of the COVID-19 pandemic: social distancing measures and policies of quarantining and isolating changed who was available or able to provide help, including relatives and paid helpers; and following limits on international travel and the enactment of public health messaging campaigns, testing, and contact tracing measures,

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school closures were the first and most common restrictions to be enacted worldwide (Hale et al., 2021). As a result, parents in high-income contexts lost important sources of both paid and unpaid childcare during the pandemic, especially in the first months of public health response.

Both mothers and their partners increased the number of hours spent on childcare during the beginning stages of the pandemic (Collins et al., 2021; Farré et al., 2020; Kreyenfeld & Zinn, 2021; Sevilla & Smith, 2020; Yerkes et al., 2020), however, the increase in unpaid work was not distributed evenly across partners. Evidence suggests that the increased amount of both childcare and housework was largely borne by women (Connor et al., 2020; Farré et al., 2020; Manzo & Minello, 2020; Obeng et al., 2022; O'Reilly, 2020; Sevilla & Smith, 2020) detrimentally impacting gender gaps in unpaid work (Collins et al., 2021; Sevilla & Smith, 2020; Yerkes et al., 2020; İlkkaracan & Memiş, 2021). Difficulty in balancing increased childcare responsibilities also impacted women economically. In most contexts, women have been more likely than men to either reduce paid workload or lose employment during the pandemic (Collins et al., 2021; Farré et al., 2020; Harry et al., 2022; Petts et al., 2021; Zoch et al., 2022); when they have kept employment, they have been more likely to report shifting their work hours to evenings and weekends (Yerkes et al., 2020), or participate more in domestic tasks (Ilkkaracan & Memiş, 2021) which has led to greater gender gaps in unpaid work.

The pandemic also deeply affected parents' mental wellbeing; with parental burnout and maternal depression increasing during the pandemic (Bastiaansen et al., 2021; Davenport et al., 2020; Dib et al., 2020; Etheridge & Spantig, 2022; Harry et al., 2022; Moltrecht et al., 2022; Myers & Emmott, 2021). Amongst concerns cited by mothers are lack of support and connection, particularly with family members besides their partners, difficulty obtaining childcare support, pandemic-related financial stress and inadequate support with their own health (Brown and Shenker, 2021; Dib et al., 2020; Myers & Emmott, 2021; Rice & Williams, 2021; Thayer & Gildner, 2021; Vazquez-Vazquez et al., 2020). Researchers have particularly emphasized the disadvantages of lockdown measures for mothers with infants (Doyle & Klein, 2020).

Here we add to the literature on the impact of the COVID-19 pandemic on women and families by exploring changes in social support during the pandemic. We draw on the cooperative breeding hypothesis, which posits that many individuals beyond the immediate family contribute to childrearing, and that cooperative reproduction is a human behaviour essential to successful childrearing in our species, including in modern industrialized settings (Sear, 2021). Despite focus on the nuclear family by policy-makers, the importance of the extended family in maintaining good maternal and child health is increasingly evidenced by studies in child nutrition and public health (Aubel et al., 2021; Martin et al., 2021). A review of studies in industrialized settings shows that grandparental investment has beneficial influences on grandchildren's psychological, social, and emotional adjustment, especially during challenging events such as divorce, remarriage, and economic difficulty (Sadruddin et al., 2019; Sear & Coall, 2011). Social support also helps with several postnatal health measures, including maternal mental health (Emmott et al., 2020; Raj & Plichta, 1998). New research evidences the increase in informal childcare help received by parents in the US during the COVID-19 pandemic (Yang et al., 2022).

While we are now understanding how the COVID-19 pandemic impacted mothers' emotional support networks (Myers & Emmott, 2021), studies on the impact of COVID-19 on childcare have largely focused on how increased responsibility of care is divided between partners. This ignores the major contributions of wider social support networks who provide significant childcare and emotional support to mothers, particularly those with young children not yet in school. The social isolation resulting from governments' responses to COVID-19 has impacted both emotional and physical support networks, limiting women's ability to receive in-person help with childcare or household

tasks, and leading to perceptions of isolation and declines in mental and physical wellbeing (Bertogg & Koos, 2022; Bierman et al., 2021; Kovacs et al., 2021; Vicari et al., 2022).

To fully understand the impact of the COVID-19 pandemic on mothers and children, research must consider how the pandemic and associated restrictions have impacted relationships with individuals within, but also beyond, the nuclear family. We examine how maternal physical and emotional support networks changed between the start of the pandemic and August 2020 when these data were collected. We then pursue two research questions (RQs). First, given evidence that mothers shouldered the burden of additional childcare and were more likely to reduce their work hours during the pandemic, is there a correlation between reduction in women's participation in paid work and a reduction in the receipt of (a) childcare support from family and friends, and (b) paid childcare support (RQ1)? And second, is there an association between women's self-reported mental health and pandemic-related changes in: (a) support received by mothers, (b) their perceived need for help, (c) their paid workload, and (d) the frequency of contact with their emotional support network (RQ2)?

We compare women's experiences between the UK and the USA to examine variation in the pandemic's impact on maternal support networks and wellbeing in two contexts with varying government policies and public health systems. Research in both countries demonstrates that mothers receive considerable support with childrearing from outside their home, which has been impacted by lockdown policies (Cantillon et al., 2021; UN Women, 2020; Yang et al., 2022). As such, we expect pandemic-related restrictions will significantly impact childcare arrangements, and that changes to support will be associated with other aspects of mothers' lives and wellbeing. Our dataset is unique in addressing these questions as we have detailed information on women's support network structures allowing us to explore the support roles of different categories of helpers, going beyond data collected only on mothers and their partners.

2. Data and methods

2.1. Data

The data used for this study were collected from an online survey of mothers conducted in August 2020. Women residing in either the UK or the US were eligible for the survey if they had at least one child under 5 years of age at the time of the survey. Participants were recruited through Prolific, an online platform connecting researchers with participants (Palan & Schitter, 2018). The survey and sampling strategies were approved by the University of Otago Human Ethics Committee (reference number D20/242) and this analysis was also approved by the London School of Hygiene and Tropical Medicine Research Ethics Committee (reference number 24002). All participants gave their informed consent for inclusion before they participated in the study. The final sample consisted of 1528 women, 919 from the UK and 609 from the US. Additional sampling and survey details are in Supplementary Information Section 1.1. The questionnaire and data associated with this research are available on the project's OSF page at: <https://osf.io/58ptu/>.

2.2. Variables

Socio-economic and demographic characteristics of mothers included in this paper are: the woman's age in decimal years; whether or not she was born in the country of current residence (yes/no); her self-reported ethnicity (binarized as white or other/mixed due to small sample sizes); her educational attainment (categorical variable with the following levels: primary, secondary, junior college, undergraduate and postgraduate); her household income quintile (continuous variable; coded with country-specific mean income for quintile cut-offs in 2018 from the US Census Bureau and Office for National Statistics UK);

whether or not she currently had a husband or coresident partner (yes/no); and the number of children residing in her home. All women responded to these questions ($n = 1528$).

To measure the impact of the COVID-19 pandemic on women's close support networks, the mother was asked to "name up to 5 women whom [she is] close to and could talk to about important matters, for example [her] children, family, health, or other things", and indicate her relationship to each individual. She was then asked "How has COVID-19 impacted your contact level with this person? Since the onset of the pandemic, do you see each other/contact each other by phone, mail or e-mail less often, about the same, or more often?" than pre-pandemic, separately for in-person and virtual contact. These responses were converted to a numeric form (-1 for less often, 0 for no change, 1 for more often) and summed across network members (separately for in-person and virtual contact) to estimate an overall change in contact with the network ($n = 23$ missing for each of these two variables as these women did not name anyone to their social network. To control for network size, this sum was converted back to a categorical scale: "Less often" if the sum was negative, "About the same" if it was 0 , and "More often" if it was positive.

To measure the impact of the pandemic on help with childcare/household tasks received, we asked mothers to list all individuals who helped care for one focal child under 5 years and/or who provided help with household tasks. All 1528 women responded to this question, however, 170 did not receive help from anyone. Carers/helpers excluded any paid or state-provided help such as nannies, teachers, or care-aids, but included the child's father. The mother indicated the relationship of the helper to the focal child and was asked, "Since the onset of the COVID-19 pandemic, does this person provide these types of childcare/household help more often, less often, or about the same as before the start of the pandemic". No further manipulation of this question was performed.

To measure changes in need for and receipt of childcare and household help, women were asked, "Since the onset of the pandemic, do you now need/receive help with childcare/household tasks less often, about the same, or more often?" Each of these three-level categorical variables were transformed into two binary variables. The first indicated whether the mother reported "About the same" (no change) or "More often," (an increase); and the second indicated whether the mother reported "About the same" (no change) or "Less often" (a decrease). For each new variable, mothers reporting the third category of answer (either "Less often" or "More often") were assigned NA values. Change in need for help measured whether the mother perceived an increase/decrease in her need for help at the time of survey compared to pre-pandemic and does not distinguish between this need being met or unmet. There were four non-responses for each of these variables ($n = 1524$).

To measure change in performance of paid work, women were asked, "Since the onset of the pandemic, do you now perform paid work less often, about the same, or more often?" This variable was also transformed into two binary variables indicating: 1) either no change or an increase and 2) either no change or a decrease. There were four non-responses for this variables ($n = 1524$).

Maternal mental health was self-reported by mothers. Research shows that self-reported health is a valid and efficient measure of both physical and mental health, particularly for women (Bačak & Ólafsdóttir, 2017; Mawani & Gilmour, 2010). Women were asked "Which of the following would you say describes your health now?" and could respond with one of four categories: "Fit and well" ($n = 530$), "Mostly well" ($n = 669$), "Often feel unwell" ($n = 276$) and "Mostly feel unwell" ($n = 53$). Due to the small number of "Mostly feel unwell" responses, and the clear distinction between those who generally feel well and those who do not, we collapsed the first two categories into "Well" ($n = 1199$) and the last two categories into "Unwell" ($n = 329$). There were no missing data for this variable ($n = 1528$).

Additional predictors used in our models were: changes in (1) receipt

of unpaid and (2) paid childcare help, (3) perceived need for childcare help, (4) performance of paid work and (5) frequency of contact with close support network (detailed earlier). The remainder of the predictor variables were assessed with a grid-question. Mothers were asked "Compare your current situation to your situation prior to the onset of the pandemic. Since the onset of the pandemic, do you now:" (1) "Need help with childcare," to measure changes in need for paid and unpaid childcare; (2) "Receive help with childcare," to measure changes in receipt of unpaid childcare; (3) "Rely on paid or state-provided childcare," used to measure changes in receipt of paid childcare; and (4) "Perform paid work," and could respond "More often," "Less often," or "About the same."

2.3. Methods

We first describe characteristics of mothers included in the sample, and the changes in contact with social network members and childcare support they experienced during the first months of the pandemic. We then evaluate our research questions using logistic regression analyses. All outcomes were modelled using binomial distributions with the 'glm' function in R (R Core Team, 2020). We ran two models for each type of change, i.e., one model tested the variables predicting whether a mother experienced increased need for childcare help during the pandemic (excluding women who experienced a decrease), and a separate model predicting whether a mother experienced decreased need for childcare help during the pandemic (excluding women who experienced an increase). Models were created separately for the US and the UK, as we expected the experience of the pandemic differed between them due to different COVID-19 restrictions (see Discussion).

Appropriate covariates for the models were determined by directed acyclic graphs (DAGs), using the R package 'dagitty' (Textor et al., 2016). DAGs are graphical representations of the relationships between variables at play in a system and are drawn using the researcher's knowledge of the system in question (McElreath, 2020). They allow researchers to isolate the effect of one treatment/exposure variable on the outcome of interest, based on understanding of mechanistic relationships between the variables in the study system. In this case, we used existing literature reviewed in the introduction to build the DAGs for each RQ. Detailed information on our analysis strategy and DAGs is provided in Supplementary Information Section 1.2. Code used to produce all analyses is available on the project's OSF page: <https://osf.io/58ptu/>.

3. Results

3.1. Sociodemographic characteristics of women

We present a description of women's characteristics by country of residence in Table 1. Our sample was biased towards younger, partnered, white women who were educated to university level and were born in the country of study (US or UK). In both countries, on average, women had less than two children co-resident with them. Participants in the UK had slightly bigger close social support networks than those in the US. Most women in both countries reported their mental health as being mostly well, compared to mostly unwell.

3.2. Change in need and receipt of support and own paid work

Roughly a quarter of mothers surveyed in both the US and the UK reported that they needed childcare and household help more often during the pandemic than they had previously (Fig. 1). However, only 21% of women in the US and 13% of women in the UK received more childcare and household help during the pandemic. In fact, 40% of women in the US and 48% of women in the UK reported that they received less childcare during the pandemic. 38% of women in the US and 30% of women in the UK reported performing less paid work during

Table 1
Women’s characteristics by country of residence (US and UK).

	US	UK
n	609	919
Age		
Mean (SD)	31.4 (5.2)	33.2 (5.3)
Has a partner		
No	78 (12.8%)	82 (8.9%)
Yes	531 (87.2%)	837 (91.1%)
Ethnicity		
Other or Mixed	162 (26.6%)	107 (11.6%)
White	447 (73.4%)	812 (88.4%)
Born in US/UK		
No	32 (5.3%)	126 (13.7%)
Yes	577 (94.7%)	793 (86.3%)
Household income		
Quintile 1	41 (6.7%)	55 (6.0%)
Quintile 2	128 (21.0%)	168 (18.3%)
Quintile3	194 (31.9%)	233 (25.4%)
Quintile4	128 (21.0%)	388 (42.2%)
Quintile5	118 (19.4%)	75 (8.2%)
Education attained		
Primary	4 (0.7%)	3 (0.3%)
Secondary	135 (22.2%)	91 (9.9%)
Junior College	95 (15.6%)	272 (29.6%)
Undergraduate	253 (41.5%)	375 (40.8%)
Postgraduate	122 (20.0%)	178 (19.4%)
Children in home		
Mean (SD)	1.8 (0.9)	1.7 (0.8)
Mental wellness		
Mostly well	455 (74.7%)	744 (81.0%)
Mostly unwell	154 (25.3%)	175 (19.0%)
Social network size		
Mean (SD)	2.9 (1.4)	3.4 (1.3)

the pandemic as opposed to before it, while a small proportion of the sample reported performing more paid work during the pandemic than before it (US: 12%, UK: 11%).

3.3. Change in contact with support network

Mothers generally reduced their level of in-person contact with all members of their support network during the pandemic (see Fig. S8 in Supplementary Information). They saw about half of their connections

in person less often during the pandemic than before and saw most of the remainder about as frequently as before. However, they increased the frequency with which they contacted their support network virtually (e. g., phone calls, texts, social media messages). Women tended to increase their contact most with their mothers, mothers-in-law, and sisters, while other kin and non-kin were contacted more often at somewhat lower rates (Fig. 2). While in the US 42% of respondents reported increasing their virtual contact with their mothers and mothers-in-law, in the UK 52% of women reported doing so.

3.4. Change in provision of unpaid childcare

Changes in unpaid childcare support were patterned by the relationship of the helper to the child (Fig. 3). Children’s fathers and mothers’ partners either maintained or increased their childcare contributions, with under 10% in both countries decreasing their contribution since the pandemic began. Broadly, the same was true for children’s siblings in the US contributed less childcare than before the pandemic. Older kin (e.g., the child’s grandparents, great-grandparents) in the UK primarily reduced childcare contributions (68%), but the same was not true in the US, where only 40% of older kin reduced support. Other kin (e.g., aunts, parents’ cousins) and non-kin also largely reduced their childcare contributions. Corresponding changes in the provision of household help to mothers are described in Fig. S9 in Supplementary Information.

3.5. Vulnerable mothers: those who reported needing more help but receiving less

Mothers indicating that they needed more childcare help during the pandemic than before, but received less, may be particularly vulnerable to negative mental health impacts. Of our participants, 12% in the UK, and 10% in the US identified this combination of effects. In the UK, this subset of women were more educated, reported poorer mental health, and before the pandemic, had relied on a greater number of unpaid childcare helpers as well as more hours of paid childcare weekly (Table 2). In the US, these women were slightly older, more educated, more likely to have experienced a change in paid work due to the pandemic (with the greatest increase for those working more since the pandemic began) and relied on a greater number of unpaid helpers prior

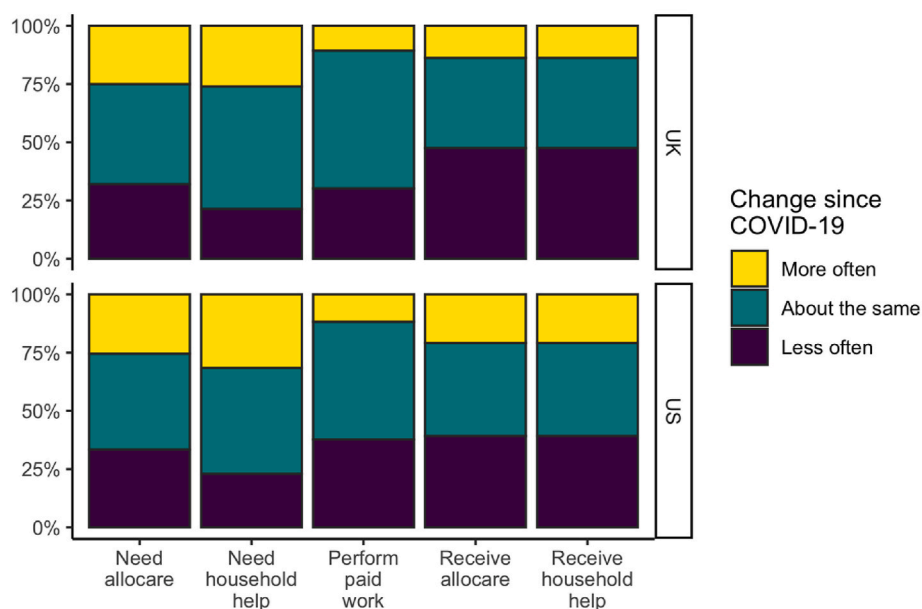


Fig. 1. Percentage of mothers who experienced a change in their need for childcare or household help, ability to perform paid work, or receipt of childcare or household help during the pandemic (mothers were asked how these things had changed since the onset of the pandemic; survey conducted in August 2020).

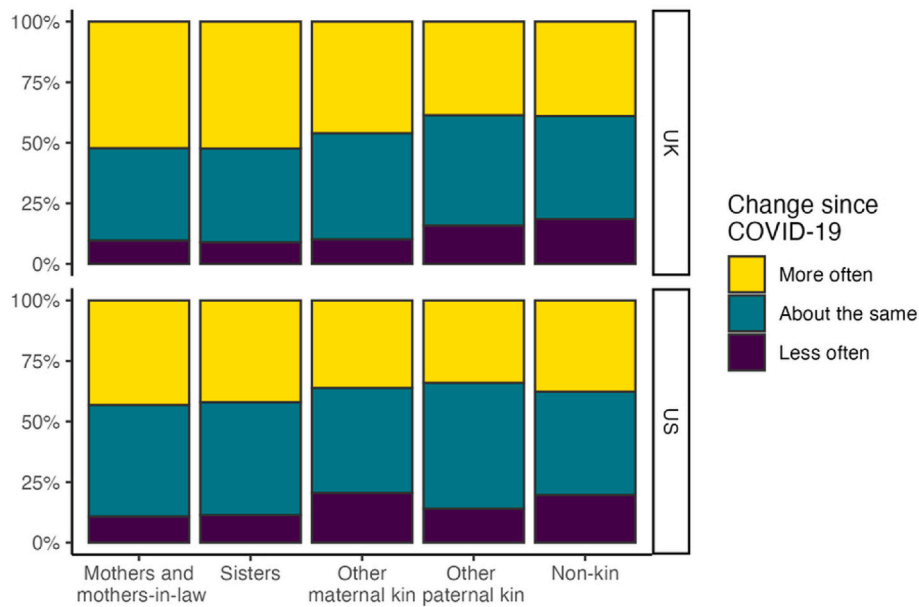


Fig. 2. Percentage of social network members contacted virtually more often, less often, or about the same during the pandemic as prior to it, by relationship to the mother (mothers were asked how these things had changed since the onset of the pandemic; survey conducted in August 2020).

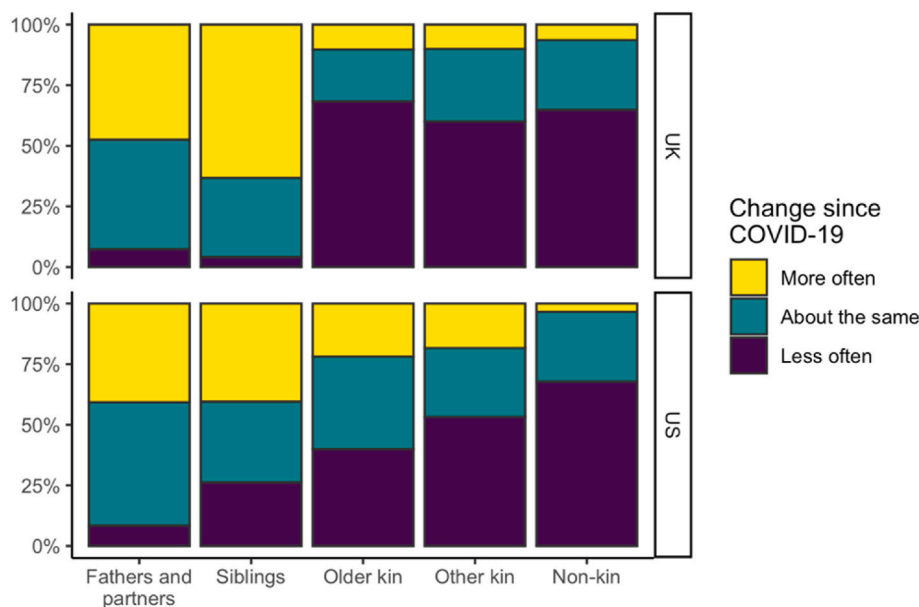


Fig. 3. Percentage of helpers providing more, less, or about the same unpaid childcare relative to their contribution prior to the pandemic, by relationship to the child (“older kin” denotes the mother’s parents’ generation or older; mothers were surveyed in August 2020).

to the pandemic.

3.6. RQ1. Receipt of childcare support and women’s participation in paid work

Women who received less unpaid childcare support during the pandemic had higher odds of reduced participation in paid work compared to women who received the same amount of support, in the US (OR: 3.1, 95% CI: 2.0, 5.0) and in the UK (OR: 2.6, 95% CI: 1.8, 3.8) (Fig. 4). Similarly, women who accessed paid childcare help less often during the pandemic than before it, had higher odds of participating less often in paid work during the pandemic, compared to women who accessed the same amount of paid childcare help, in both countries (US: OR: 4.8, 95% CI: 3.2, 7.0; UK: OR: 2.9, 95% CI: 2.1, 4.0). See

Supplementary Information Table S2 and Table S3 for full models. In post-hoc analyses, we explored whether the relationship between women accessing less paid childcare support and their reduced participation in paid work varied by their level of wealth but found no evidence for this (Supplementary Information Table S4).

3.7. RQ2. Women’s self-reported mental health and changes in childcare help, paid work, and contact with close social network

The majority of women in both the US (75%) and the UK sample (81%) rated their mental health at the time of survey as mostly well or better, with the percentage of women reporting unwell mental health slightly higher in the US (25%) than in the UK (19%). In the US, the sociodemographic factors associated with reporting poorer maternal

Table 2
 Characteristics of women who needed more childcare help but received less during the pandemic compared to the rest of the sample.

	US			UK		
	Need more, Receive less (n=61)	Other women (n=541)	p	Need more, Receive less (n=107)	Other women (n=812)	p
Age			0.01			0.38
Mean (SD)	33 (6.2)	31.2 (5.1)		33.6 (5.21)	33.2 (5.3)	
Has a partner			0.50			0.58
No	6 (9.8%)	70 (12.9%)		8 (7.5%)	74 (9.1%)	
Yes	55 (90.2%)	474 (87.1%)		99 (92.5%)	738 (90.9%)	
Household income			0.79			0.32
Quintile 1	4 (6.6%)	36 (6.6%)		8 (7.5%)	47 (5.8%)	
Quintile 2	9 (14.8%)	117 (21.5%)		12 (11.2%)	156 (19.2%)	
Quintile 3	21 (34.4%)	172 (31.6%)		28 (26.2%)	205 (25.2%)	
Quintile 4	15 (24.6%)	113 (20.8%)		48 (44.9%)	340 (41.9%)	
Quintile 5	12 (19.7%)	106 (19.5%)		11 (10.3%)	64 (7.9%)	
Ethnicity			0.51			0.62
Other or Mixed	14 (23.0%)	146 (26.8%)		14 (13.1%)	93 (11.5%)	
White	47 (77.0%)	398 (73.2%)		93 (86.9%)	719 (88.5%)	
Born in US/UK			0.46			0.84
No	2 (3.3%)	30 (5.5%)		14 (13.1%)	112 (13.8%)	
Yes	59 (96.7%)	514 (94.5%)		93 (86.9%)	700 (86.2%)	
Education attained			0.06			0.07
Primary	0 (0.0%)	4 (0.7%)		0 (0.0%)	3 (0.4%)	
Secondary	11 (18.0%)	122 (22.4%)		3 (2.8%)	88 (10.8%)	
Junior College	8 (13.1%)	87 (16.0%)		29 (27.1%)	243 (29.9%)	
Undergraduate	21 (34.4%)	231 (42.5%)		50 (46.7%)	325 (40.0%)	
Postgraduate	21 (34.4%)	100 (18.4%)		25 (23.4%)	153 (18.8%)	
Change in paid work			0.02			0.08
About the same	23 (37.7%)	283 (52.0%)		53 (49.5%)	491 (60.5%)	
Less often	25 (41.0%)	203 (37.3%)		38 (35.5%)	239 (29.4%)	
More often	13 (21.3%)	58 (10.7%)		16 (15.0%)	82 (10.1%)	
Children in home			0.71			0.18
Mean (SD)	1.8 (0.9)	1.8 (0.9)		1.8 (0.8)	1.7 (0.8)	
Mental wellness			0.86			0.02
Mostly well	45 (73.8%)	407 (74.8%)		78 (72.9%)	666 (82.0%)	
Mostly unwell	16 (26.2%)	137 (25.2%)		29 (27.1%)	146 (18.0%)	
Social network			0.90			0.42
Mean (SD)	2.9 (1.4)	2.9 (1.4)		3.5 (1.2)	3.4 (1.3)	
Unpaid helpers			<0.01			0.04
Mean (SD)	2.3 (1.6)	1.6 (1.2)		2.2 (1.7)	1.9 (1.5)	
Paid childcare			0.64			<0.01
Mean (SD)	10.8 (15.1)	9.9 (14.5)		15.4 (13.0)	11.2 (12.6)	

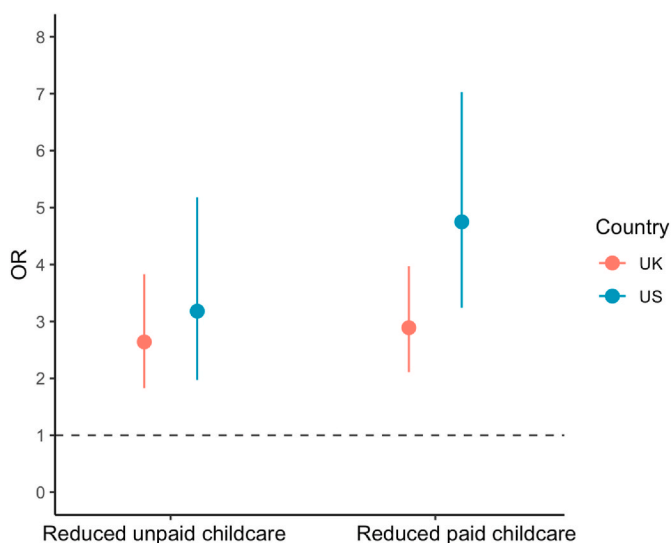


Fig. 4. Odds ratio (dot) and 95% confidence interval (whiskers) for the effect of a reduction in unpaid childcare help (left; RQ1 Model 1 exposure variable) and a reduction in paid childcare help (right; RQ1 Model 2 exposure variable) on women's reduced performance of paid work (RQ1 outcome variable). Model 1 included as covariates: woman's age, woman's education, number of children in home, if the woman was partnered and changes in receipt of paid childcare help. Model 2 included as covariates: woman's age, woman's ethnicity and number of children in home.

mental health were: lower income quintile, being born in the US, and higher levels of education. In the UK, sociodemographic factors associated with reporting poorer maternal mental health were: being younger, not being partnered, having a lower household income quintile, being born in the UK, and lower education. Women's characteristics by their self-reported mental health are in Supplementary Information Table S5.

We found no evidence of an association between either more or less childcare help received and women's mental health in either the US or the UK (Fig. 5, Table S6). However, women who reported an increased perceived need for childcare help during the pandemic in the US had higher odds of reporting worse mental health (OR: 1.8, 95% CI: 1.1, 3.0). There was no equivalent association between these variables in the UK. There was no evidence of an association, in the US or the UK, between women's mental health and either an increase or decrease in their (a) participation in paid work, (b) virtual contact or (c) in-person contact with their support network. However, only in the UK, women with increased in-person contact with their close support network during the pandemic had higher odds of reporting worse mental health (OR: 2.4, 95% CI: 1.1, 5.1). Further, women in the US who reported a decrease in the receipt of paid childcare during the pandemic had lower odds of reporting worse mental health compared to women who accessed the same amount of paid childcare (seen throughout Table S6).

4. Discussion

Our results stress the considerable impact of the COVID-19 pandemic on mothers of young children in the US and the UK between the onset of the pandemic and August 2020. In both countries, more women

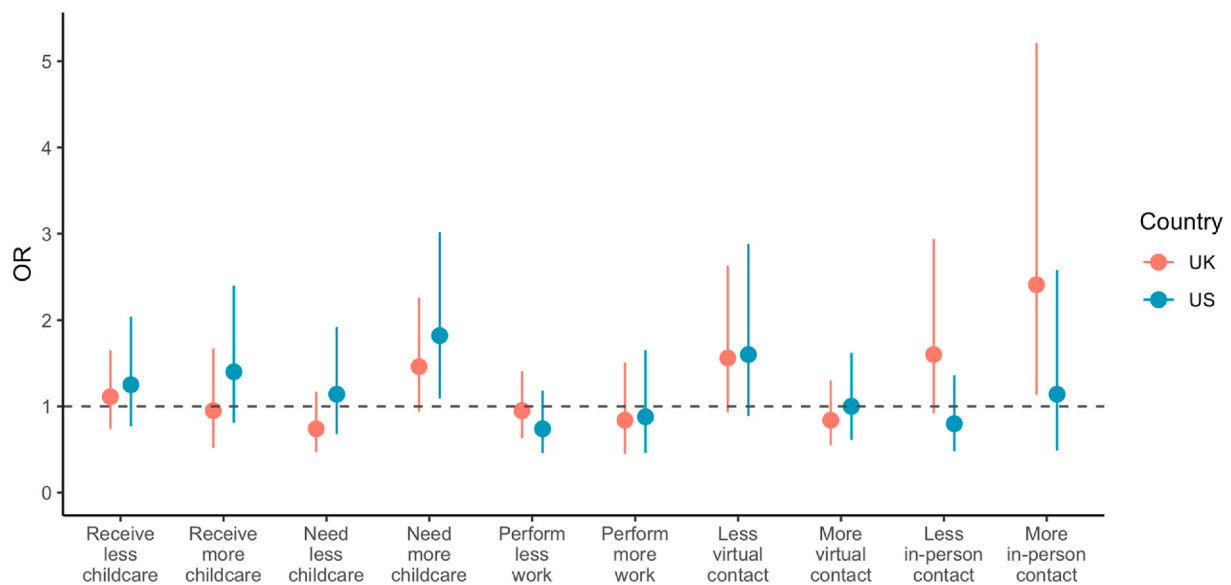


Fig. 5. Odds ratio (dot) and 95% confidence interval (whiskers) for effects of receiving less and more childcare help (RQ2 Model 1 exposure variable), needing less and more childcare help (RQ2 Model 2 exposure variable), performing less and more paid work (RQ2 Model 3 exposure variable), and having less and more virtual contact with social network (RQ2 Model 4 exposure variable) on women's mental health reported as mostly unwell (RQ2 outcome variable). Inclusion of covariates: Models 1 & 2 included woman's age, education, and if she was born in the UK/USA, number of children in home, change in receipt of paid childcare help and household income; Model 3 included woman's age, change in receipt of childcare help, number of children in home, change in need for childcare help, change in paid childcare help and household income; Model 4 included woman's age, education, if she was partnered, change in physical contact with social network, change in need for childcare help, change in paid childcare help, and performance of paid work.

indicated an increased need for help than those reporting increased receipt of help; and nearly half of the women reported receiving less overall help with childcare than before the pandemic. This lack of support is associated with reductions in women's participation in the labour force, with at least one-third of women in both countries reporting decreased participation in paid work during the pandemic. Reductions in both unpaid and paid childcare during the pandemic are associated with reductions in mother's work, consistent with other studies that show women have disproportionately suffered from loss of employment or reduction of work hours during the pandemic globally (Farré et al., 2020; Petts et al., 2021; Yerkes et al., 2020; Zoch et al., 2022). These patterns suggest that the start of the pandemic had worsened financial and support environments for mothers of young children.

4.1. Structure of maternal support networks

The structure of maternal support networks nuclearized at the start of the pandemic, i.e., maternal networks contracted and emphasized close kin over other individuals. Women met their close support network in person less often during this period, except for co-resident individuals, but in balance, increased virtual contact with close relatives (mothers, mothers-in-law, sisters). Virtual contact was increased less with distant relatives and non-kin, perhaps because these individuals were primarily contacted virtually even prior to the pandemic, and the effect of social distancing measures on contact type were muted. Non-kin had the highest rates of decreased physical contact and the lowest rates of increased virtual contact, suggesting that mothers privileged contact with close kin over others. This nuclearization of networks was also evident with help with childcare and household tasks. In both countries, children's fathers and siblings and women's partners increased contributions to childcare during the pandemic, whereas older relatives, other relatives, and non-relatives all provided less support than before. Similar patterns were seen for household help, though a higher percentage of distant kin and non-kin provided "about the same" amount of help, likely because these helpers provided little help with household tasks prior to the pandemic.

The greater participation of children's fathers, step-fathers, and siblings is likely due to co-residence with the mother/child: these individuals are more available to help during periods of social distancing compared to others. Older relatives, especially women's parents or parents-in-law, are important childcare providers in these contexts in normal times (Aubel, 2012; Emmott et al., 2020; Kanji, 2018; Myers et al., 2021; Sadruddin et al., 2019). In the UK, Myers et al. (2021) show that in their sample of 515 mothers, 62% received help with domestic tasks, and 45% with childminding, from their own mothers. In our sample too, before the pandemic, 41% of childcare helpers in the UK, and 29% in the US, were older kin (e.g., the child's grandparents, great-grandparents). Given that multi-generational households (i.e., containing grandparents, adult parents and young children) are relatively rare in the UK and US (Pilkauskas & Martinson, 2014), older kin are likely non-resident, and were more likely to isolate or shield during the pandemic compared to younger individuals, reducing their ability to provide physical support. Importantly, most non-resident helpers decreased their level of childcare support during the pandemic, while almost half of co-resident helpers increased it. More distant kin and non-kin may have been deterred from maintaining childcare support by social distancing mandates, or by the perceived risk of disease transmission.

The pattern of nuclearization was stronger in the UK than in the US, likely due to different experiences of pandemic-related restrictions (see [Supplementary Information Section 3](#) for short national summaries of these closures). For example, the UK imposed strict school and early-learning centre closures in March 2020, accompanied by the closure of non-essential workplaces. While some schools and childcare centres reopened in the summer, many workplaces continued to operate remotely (Tatlow et al., 2021). In the US, schools and day-cares also largely closed in March 2020, but workplaces tended to reopen over the course of the summer: by August, only one state still required all non-essential businesses to close, and closures were fully lifted in 15% of states. By August nearly half of states continued to require schools at all levels to be closed, while most remaining states implemented targeted closures for certain types of schooling centres (Hallas et al., 2020). It is

possible that mothers in the US faced trade-offs where they were asked to return to work while having limited paid childcare options, and thus a greater need for support from non-resident kin and non-kin. Additionally, in the US, misperceptions regarding COVID-19 were more strongly related to political affiliation than in the UK, and holding such misperceptions was associated with less risk-mitigation behaviour (Imhoff & Lamberty, 2020; Pennycook, McPhetres, Bago, & Rand, 2021). As such, US participants in our study may not have adhered to social distancing and risk-mitigation measures that UK participants did, with US families being more likely than UK families to continue receiving childcare from their support networks. Greater familial dispersion in the US (on average, 4.3 kin members resided within one hour's travel time for our sample of mothers in the US, and 5.4 kin members in the UK) could also mean lower levels of inter-generational support than in the UK, even pre-pandemic.

4.2. Associations between pandemic-related changes, work, and mental health

The associations between mothers' receipt of childcare support and own paid work are consistent with what is known about the pandemic's impact on household economics. In our sample, roughly a third of mothers reported reducing work hours since the pandemic began. Unfortunately, we don't have information on mothers' performance of domestic tasks and cannot investigate whether an increase in her childcare duties occurred alongside a reduction of paid work. However, because it has been documented across countries that women shouldered the bulk of additional childcare during the pandemic (Connor et al., 2020; Farré et al., 2020; Manzo & Minello, 2020; O'Reilly, 2020; Sevilla & Smith, 2020), it is likely that reductions in paid and unpaid childcare resulted in the mother performing that work herself. Allocating more of their limited time and energy towards childcare (or other domestic tasks) would mean either reducing allocation towards paid work, or an increased burden of overall tasks; with both situations causing potential additional physical and mental stress on mothers. Women in the US who received less childcare help were also wealthier, better educated and primarily reduced their work hours during the pandemic (Table S1) possibly signifying that women reducing their work hours were those who could afford to do so. This has been demonstrated in the US previously where women with higher income jobs were more likely to reduce their work hours after having a child (Landivar, 2017).

The observed reductions in paid work in our UK sample may partially be due to government furlough schemes. From March 1, 2020 to September 30, 2021, the UK government provided grants to employers to enable them to retain and continue paying their employees during coronavirus related lockdowns, by furloughing employees at up to 80% of their salaries (House of Commons Library, 2021). We do not know if UK women in our sample who reported reduced participation in paid work during the pandemic were financially dependent on the furlough scheme, had simply reduced their work hours, or had entirely lost employment. However, a study of furlough schemes in the UK demonstrates that while being furloughed or having reduced working hours, compared to losing work entirely, was protective of men's mental health, they were not as effective for women's mental health (Wang et al., 2022).

Not only has the COVID-19 pandemic increased the burden of care on women (Connor et al., 2020; Farré et al., 2020; Manzo & Minello, 2020; Obeng et al., 2022; Power, 2020; Sevilla & Smith, 2020), and widened gender gaps in paid work (Collins et al., 2021; Harry et al., 2022; Petts et al., 2021; Vicari et al., 2022; Yerkes et al., 2020; Zoch et al., 2022) but these gendered losses in employment - and subsequently income - are also likely to have long-term adverse effects on women's career trajectories, economic security, and financial wellbeing (Ellingrud & Segel, 2021; Hill, 2020; Landivar, 2017). In fact, research already indicates that the pandemic has been detrimental to the progress made towards

gender equality in paid work over the past decades (Kashen et al., 2020).

We finally find that, in the US, mothers who perceived increased need for childcare support had higher odds of reporting worse mental health, while changes in actual receipt of childcare did not clearly predict mental health. This suggests that having a greater need for help and struggling to meet this need, regardless of whether it is then met or not, can have deleterious effects on maternal mental health. Mothers who decreased virtual contact with their social network also had much higher odds of reporting worse mental health. Although confidence intervals for this effect size crossed one, this reinforces the key role that social networks play in supporting mothers during the pandemic (Molrecht et al., 2022; Myers & Emmott, 2021). For UK women, an increase in in-person contact with their support network predicted worse mental health. A similar finding was reported by Myers and Emmott (2021): in-person contact with relatives during the pandemic was associated with worse maternal mental health in mothers, possibly because kin would be more willing to risk seeing mothers if they knew them to be struggling. A qualitative study with Canadian postpartum women found that mothers who sought help out of desperation tended to reach out to whomever was most available to them, typically an older parent at higher risk for complications from COVID-19 illness (Rice & Williams, 2021). In our sample, UK mothers who were unwell increased contact with kin more than mothers who were well, particularly with sisters and other maternal kin (Fig. 6). These mothers may have reported feeling less well because they were taking risks to provide additional support to their close social networks; they were unwell and thus risking contact in order to receive support themselves; or as Myers and Emmott (2021) suggest, risking in-person contact with family members during socially distanced conditions only reminded women of the support they needed and/or were not receiving, which caused further distress.

That we found few associations between pandemic-related changes and maternal mental health was surprising, given that many other studies have documented a worsening in women's mental health associated with the pandemic (Bastiaansen et al., 2021; Davenport et al., 2020; Dib et al., 2020; Myers & Emmott, 2021); and in fact, that women's mental health has been more affected than men's, possibly due to increased burdens of care as well as reductions in paid work and associated financial pressures (Etheridge & Spantig, 2022; Wang et al., 2022; Zoch et al., 2022). However, when our data were collected in August 2020, both the UK and the US were beginning to reopen and/or exit lockdowns. Evidence suggests that while rates of mental health difficulty stayed elevated throughout 2020, the rate of maternal depression reduced slightly in July 2020 when lockdowns were eased in the UK (Daly & Robinson, 2021; Myers & Emmott, 2021). In the US, mental health worsened substantially in March 2020 but returned to baseline in June (Daly & Robinson, 2021). As our data were collected during a period of easing of pandemic control measures, we may have missed the strongest period of distress, particularly in the US.

4.3. Policy implications

The first policy implication of our findings is to ensure women have continued access to childcare, whether paid or unpaid, in the event of a crisis like the COVID-19 pandemic. The nuclearization of maternal social networks increased both physical and emotional pressures on the immediate family, including on mothers as well as fathers, siblings, and children. This increased burden on families has already been reported as a risk factor for parental burnout (Bastiaansen et al., 2021; Harry et al., 2022), and appears related to the significant reductions in female participation in paid labour witnessed during the pandemic. Both phenomena strongly highlight, more than ever before, the need for good quality, reliable and affordable childcare options to be available to mothers (and families) that reduce women's burden of unpaid care labour, allow them to re-enter (or remain in) paid labour and support their mental wellbeing (Herten-Crabb & Wenham, 2022; Hill, 2020). Policy-makers should account for the wider-ranging and gendered social,

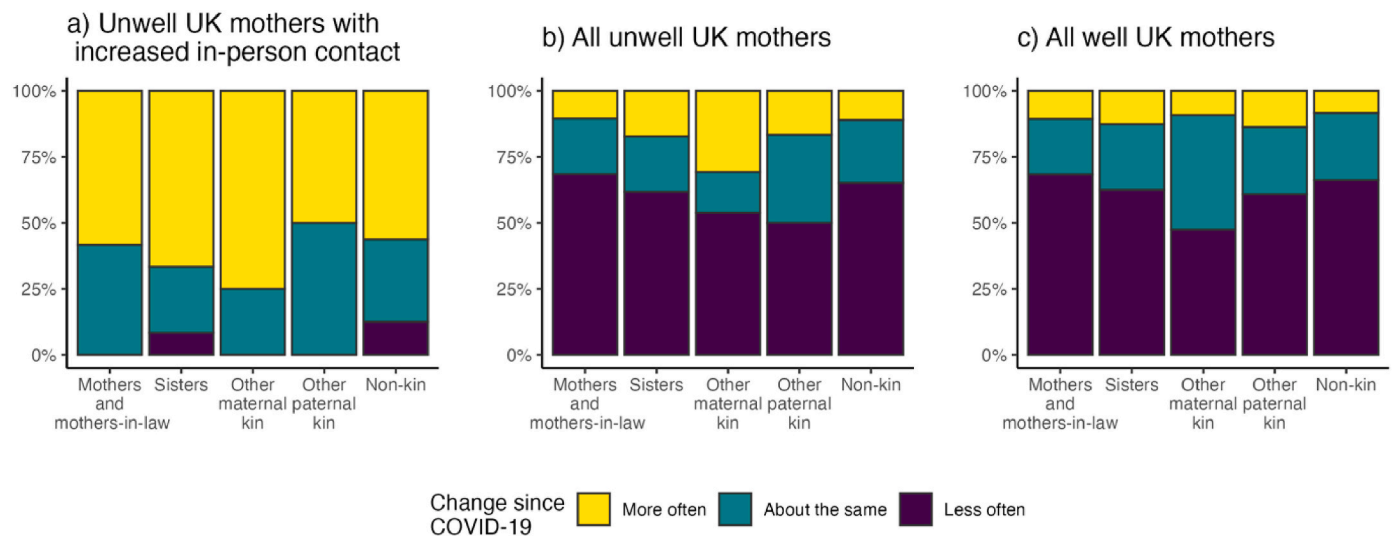


Fig. 6. Percentage of social network members being contacted in person more often, about the same, or less often prior to the pandemic, by their relationship to the mother, for the following groups of mothers: a) UK mothers who report unwell mental health and have increased in-person contact with social networks ($n = 20$); b) all UK mothers who report unwell mental health ($n = 175$); c) all UK mothers who report well mental health ($n = 744$).

economic, and health impacts of policies and programmes which introduce community wide physical isolation. Specifically, it is imperative to consider the resulting losses of childcare and domestic support for mothers (paid and unpaid) and the reductions in their paid work which have potentially harmful consequences for entire families.

The second implication of our study is that some women are more susceptible to mental health impacts due to the isolation and unmet need for childcare support resulting from government mandated lockdowns. In both countries, these vulnerable women had higher education and had depended on a larger number of carers before the pandemic than the rest of the sample. Higher levels of educational attainment could indicate higher paid or more demanding jobs, and thus dependence on more carers pre-pandemic. As many jobs shifted online during the pandemic, and support systems diminished, these women likely had to balance childcare with work, increasing their need for help. In the UK, these vulnerable women also reported worse mental health compared to the rest of the sample. Importantly, these mothers were not more likely to be unpartnered, i.e., partners did not buffer women from an unmet need for childcare support. With childcare support from partners becoming especially important during the pandemic, we believe that unpartnered women with older children (underrepresented in our sample) may also have been particularly vulnerable during this period and should be a priority group in future research and policy. Given the extensive research that already exists on the mental health impacts of the pandemic, and the importance of social support for vulnerable populations (Gayatri & Irawaty, 2022; Moltrecht et al., 2022) our findings only reiterate the duty of governments and policymakers to identify vulnerable mothers and tailor policies towards their needs.

4.4. Conclusion

Our study examined the impact of the COVID-19 pandemic on women's emotional and physical support networks, documenting that support networks nuclearized during the first months of the pandemic. Reductions in both paid and unpaid sources of physical support were associated with a decrease in engagement in paid work, and poor mental health with increased need for childcare help and increased in-person contact with support networks. This concurs with global research that demonstrates associations between increased responsibilities for mothers at home during the pandemic, altered working conditions, and declines in maternal wellbeing. Our study contributes to this growing literature, documenting the critical impact of the COVID-19 pandemic

and associated public health measures on women's access to their physical and emotional support networks and on their financial and emotional wellbeing. We particularly emphasize the importance of maternal support networks that extend beyond the nuclear family. In future responses, policy makers should pay particular attention to mothers' needs when designing public health measures to soften long-lasting detrimental effects of these interventions.

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Data availability statement

Data are available upon request from the authors.

CRediT authorship contribution statement

Anushé Hassan: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Laure Spake:** Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **John H. Shaver:** Supervision, Funding acquisition. **Mary K. Shenk:** Funding acquisition. **Richard Sosis:** Funding acquisition. **Rebecca Sear:** Supervision, Funding acquisition.

Declaration of competing interest

None

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssaho.2024.100932>.

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