Empirical Article

Mapping the well-being of Norwegian mothers during the COVID-19 pandemic

MARIE KVALØ,[1,2] ELIZABETH J. PARKS-STAMM,[3] KJÆRSTI THORSTEINSEN,[4] MARTE OLSEN[2] and SARAH E. MARTINY[2]

[1]*The Regional Centre for Child and Youth Mental Health and Child Welfare, Faculty of Health Sciences, UiT The Arctic University of Norway, Tromsø, Norway*
[2]*Department of Psychology, Faculty of Health Sciences, UiT The Arctic University of Norway, Tromsø, Norway*
[3]*Department of Psychology, University of Southern Maine, Portland, ME, USA*
[4]*NORCE Norwegian Research Centre, Tromsø, Norway*

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The COVID-19 pandemic had negative effects on many people's well-being and quality of life. In the present work, we focused on Norwegian mothers with elementary school children, and investigated whether their well-being, stress, and worries (and the relationships between them) changed across the early months of the pandemic. We collected data at two time points in 2020. In June 2020, 231 mothers (mean age = 40.09, $SD = 6.22$) responded to an online questionnaire in which they were asked to indicate their well-being, stress, and worries before the pandemic, during the lockdown (i.e., March 2020), and currently (i.e., June 2020). Of these 231 mothers, 97 (mean age = 40.58, $SD = 5.66$) answered the same questionnaire again in November 2020. Mothers' well-being was lower in November 2020 than before the pandemic (retrospectively reported). The age of the youngest child showed the strongest and most consistent relationship with mothers' well-being across all time points. In addition, we found that the stress mothers felt during the national lockdown in March 2020 was strongly associated with their well-being both during the lockdown and in June 2020. Finally, in November 2020, mothers' financial pandemic-related worries were negatively related to their well-being. Implications and suggestions for future research and for how societies can cope with future health-related crises are discussed.

Key words: COVID-19, well-being, mothers, mental health, stress.

Marie Kvalø, The Regional Centre for Child and Youth Mental Health and Child Welfare, Faculty of Health Sciences, UiT The Arctic University of Norway, Tromsø, Norway. E-mail: marie.kvalo@uit.no

INTRODUCTION

In early 2020, the SARS-CoV-2 virus spread quickly across the world, leading to a high number of infections and deaths. This led many governments to implement severe restrictions and lockdowns in spring 2020. In many countries, schools and childcare facilities were closed, people worked from home, and stores and restaurants were shuttered for several weeks to months. Thus, the pandemic along with the severe restrictions led to major disruptions in millions of people's everyday lives. Research shows that this had negative consequences for many people's well-being and mental health (for reviews and meta-analyses see Bueno-Notivol, Gracia-García, Olaya, Lasheras, López-Antón & Santabárbara, 2021; Robinson, Sutin, Daly & Jones, 2022; Vindegaard & Benros, 2020; Wu, Jia, Shi *et al.*, 2021). Households with children were particularly affected by the pandemic, with numerous studies showing that parental and child well-being were lower during the pandemic than before (Cameron, Joyce, Delaquis, Reynolds, Protudjer & Roos, 2020; Etheridge & Spantig, 2020; Gassman-Pines, Ananat & Fitz-Henley, 2020; Whaley & Pfefferbaum, 2023; for a meta-analysis see for example Racine, Eirich, Cooke *et al.*, 2022).

Well-being of mothers during the COVID-19 pandemic

In the present paper, we focus on the well-being of mothers with elementary school children, as previous research shows that the closure of schools and childcare centers during the COVID-19 pandemic disproportionately impacted families (e.g., Gayatri & Irawaty, 2022; Martiny, Thorsteinsen, Parks-Stamm, Olsen & Kvalø, 2021; Rohde, Helseth, Skarstein, Småstuen, Mikkelsen & Haraldstad, 2022) and particularly mothers (e.g., for a meta-analysis see Racine, Eirich, Cooke *et al.*, 2022). Empirical studies across different countries found that during the pandemic women in general suffered more compared to men (de Pedraza, Guzi & Tijdens, 2020; Etheridge & Spantig, 2020; O'Connor, Wetherall, Cleare *et al.*, 2021; Özmen, Özkan, Özer & Yanardağ, 2021). In addition, mothers' worries about childcare increased (Czymara, Langenkamp & Cano, 2021) and their well-being was more negatively affected than fathers' (Reme, Wörn & Skirbekk, 2022; Thorsteinsen, Heijens, Parks-Stamm, Froehlich & Martiny, 2024; Vicari, Zoch & Bächmann, 2022). However, relatively little research has been conducted concerning the impact of COVID-19 on Norwegian mothers. For example, although one study found a reduction in life satisfaction in a large sample of Norwegian adults, along with an increase in loneliness and psychological distress compared to before the pandemic (Kalseth, Ådnanes, Ose, Lassemo, Kaspersen & das Nair, 2023), it did not include information about parenting status. Johnson, Skjerdingstad, Ebrahimi, Hoffart and Johnson (2022) did focus on Norwegian mothers, and this study showed that Norwegian mothers reported higher levels of parental stress, anxiety, and depression symptoms than fathers. We aim to extend this work

and to better understand how the pandemic affected the well-being of Norwegian mothers of elementary school children (aged 6–13 years). To do so, we examined well-being in mothers over the course of the pandemic to explore potential changes. Further, we examined what predictors might explain variation in maternal well-being during the pandemic. Specifically, we used predictors that have been shown to be important for maternal well-being in normal times and applied these to the pandemic period.

Predictors of maternal well-being. Research shows that family-related variables such as family structure (i.e., being a single parent or not), income, and age of the youngest child are important predictors of parental well-being (Diener, Gohm, Suh & Oishi, 2000; Huebener, Waights, Spiess, Siegel & Wagner, 2020; Li, Bünning, Kaiser & Hipp, 2022). Concerning family structure, researchers have argued that marital status can affect parenting experiences and mental health (Campbell, Thomson, Fenton & Gibson, 2016; Nomaguchi & Milkie, 2020). For example, research shows that single parents report more work–family conflict (Nomaguchi, 2012), greater parenting strain (Nomaguchi & House, 2013), higher chances of reporting lower health (Rousou, Kouta, Middleton & Karanikola, 2013), and lower well-being while spending time with children (Meier, Musick, Flood & Dunifon, 2016) than non-single parents. However, cross-cultural research shows that these negative effects of single parenthood do not generalize across all cultural contexts. Stavrova and Fetchenhauer (2015) found that single parents only reported lower life satisfaction and well-being (compared to cohabiting parents) in collectivist countries and in countries with a strong two-parent family norm, with Norway provided as an example of a country where single-parenting is an acceptable practice. This may suggest that single parenthood would not be a risk factor for mothers in Norway. However, research conducted during the pandemic shows that single mothers faced enormous challenges combining work and domestic responsibilities (Hertz, Mattes & Shook, 2021; Wakai, Nawa, Yamaoka & Fujiwara, 2023). During school closures parents had to combine working –often from home– with supporting their children in their schoolwork (Pino Gavidia, Seens, Fraser *et al.*, 2022), which had negative consequences for their mental health (e.g., Guetto, Pirani & Lodetti, 2021) and well-being (Tharp, Parks-Stamm, Kitces & Lurtz, 2021). Single parents had to take on this extra work alone. Thus, Norway provides an important context for studying the role of family status (i.e., being a single parent vs. a member of a two-parent household) on the change of maternal well-being during the pandemic.

Concerning income, most research conducted during the pandemic showed that individuals with lower incomes had an increased likelihood of experiencing negative consequences from the pandemic on their income, employment, and mental health (e.g., Hall, Sanchez, de Graca, Bennett, Powers & Warren, 2022). In line with this, studies have shown a positive relationship between household income and well-being during the pandemic (Kerr, Rasmussen, Fanning & Braaten, 2021; Özmen, Özkan, Özer & Yanardağ, 2021), with those with lower income experiencing more fear of COVID-19 (Özmen, Özkan, Özer & Yanardağ, 2021) and higher stress associated with factors like

food insecurity (Ling, Duren & Robbins, 2022). However, other research has found negative relationships between income and well-being during lockdown (Thorsteinsen, Parks-Stamm, Kvalø, Olsen & Martiny, 2022) or greater decreases in well-being among those with higher socio-economic status (SES; Wanberg, Csillag, Douglass, Zhou & Pollard, 2020). Again, Norway provides an important context in which to test the relationship between income and maternal well-being, as Norway has a well-functioning social welfare system that is supportive to mothers and lower-income families (Hagemann, 2007).

Earlier research finds no consistent link between age of children and parental well-being (e.g., Evenson & Simon, 2005; Fang, Luo, Boele, Windhorst, van Grieken & Raat, 2022). During the pandemic, however, several studies found that children's age was an important predictor of parental well-being (Huebener, Waights, Spiess, Siegel & Wagner, 2020), with younger children associated with lower maternal well-being (Calarco, Anderson, Meanwell & Knopf, 2020; Racine, Eirich, Cooke *et al.*, 2022). This is not surprising because managing the combined responsibilities of working from home and taking care of young children was perceived as a source of stress and anxiety for many mothers (Calarco, Anderson, Meanwell & Knopf, 2020; Calear, McCallum, Morse *et al.*, 2022). Again, studying this question within the specific context of Norway would be important, as it ranks in the top three countries in its family-friendly policies (i.e., parental leave and early childhood education; Chzhen, Gromada & Rees, 2019). Therefore, in the present work, we will also investigate whether the age of the youngest child in the family was related to Norwegian mothers' change in well-being during the pandemic.

Stress and worries as reasons for reduced maternal well-being during the pandemic. In the present work, we adopt a perspective based on the transactional model of stress by Lazarus (Lazarus & Folkman, 1984), which describes a two-stage process: People encounter stressors in their environment that they then appraise based on their perceived resources to cope with these stressors (Zacher & Rudolph, 2021). Individuals' stress responses are determined by perceived demands, social changes, and personal resources, with stress resulting when the demands overwhelm one's resources to cope (Roohafza, Feizi, Afshar *et al.*, 2016). In line with this, the COVID-19 pandemic caused social change, increased demands on parents, and reduced social resources. For example, the pandemic-induced social changes (e.g., the closure of schools and loss of income or pay) led to increases in parenting demands and stress (Chen, Byrne & Vélez, 2022). At the same time, the social support system normally in place fell apart (e.g., childcare, social contact, recreational activities, and help from extended family), and reduced the opportunity for socially-supported coping strategies (Zacher & Rudolph, 2021). This reduction in resources, along with the increase in social changes and demands, resulted in an increase in stress, which –as outlined above– particularly affected mothers' well-being negatively (e.g., Reme, Wörn & Skirbekk, 2022; Thorsteinsen, Heijens, Parks-Stamm, Froehlich & Martiny, 2024; Vicari, Zoch & Bächmann, 2022). Studies investigating the reasons for reduced parental well-being during the pandemic find an increased level of stress and parenting-related exhaustion in parents, with a stronger

increase for mothers than for fathers (e.g., Giannotti, Mazzoni, Bentenuto, Venuti & de Falco, 2022; Marchetti, Fontanesi, Mazza, Di Giandomenico, Roma & Verrocchio, 2020). In addition, research shows a strong relationship between fear and worry about the pandemic and parents' psychological distress (Chen, Byrne & Vélez, 2022). These variables appear to have worked together to undermine well-being. A study conducted in Italy found that family structure, including the number of children and the number of children with psychological, physical, or genetic diseases, worked as risk factors for a high stress level among parents, which in turn was linked to lower levels of well-being (Cusinato, Iannattone, Spoto *et al.*, 2020).

Taken together, research has found several family-related variables influence maternal well-being. At the same time, the COVID-19 pandemic served as an additional stressor that contributed to high levels of stress in mothers with young children. However, predictors of well-being may differ by cultural context (e.g., Stavrova & Fetchenhauer, 2015). Norway is a particularly important context to study these relationships, as one of the most gender-egalitarian countries in the world (World Economic Forum, 2022), with strong family-supportive policies (Ellingsæter, Kitterød & Lyngstad, 2017), and a well-functioning social security system in terms of healthcare, childcare, and financial support. For this reason, we will investigate how Norwegian mothers' stress and well-being was affected by the pandemic across two time points in the pandemic year 2020 and whether stress and worries mediated the relationship between family structure, income, and well-being at different time points during the pandemic. This will add important knowledge about how a vulnerable population –namely mothers of young children– was affected by the pandemic in a modern welfare state.

THE PRESENT RESEARCH

As part of a larger project examining the consequences of the COVID-19 pandemic for European children and mothers (Martiny, Thorsteinsen, Parks-Stamm, Olsen & Kvalø, 2021; Thorsteinsen, Heijens, Parks-Stamm, Froehlich & Martiny, 2024; Thorsteinsen, Parks-Stamm, Kvalø, Olsen & Martiny, 2022; Thorsteinsen, Parks-Stamm, Olsen, Kvalø & Martiny, 2021), the present research focuses on data collected from mothers at two time points in Norway in 2020. In Norway, the government implemented strict restrictions and went into a national lockdown on March 12, 2020. Those who could had to work from home, and all schools and childcare facilities closed for children whose parent was not an essential worker (i.e., healthcare and grocery store workers). In April, several restrictions were lifted, and businesses were allowed to open if they could meet the guidelines for infection control. Daycare centers and schools reopened between April 20th and April 27th. In June, society had reopened, and infection rates had started to increase. The reopening slowed down in August, with new restrictions implemented in October to limit new infections (see Regjeringen, 2020, for a timeline of the Norwegian government's restrictions and changes implemented to handle the pandemic). In June 2020, we asked mothers to indicate their well-being, stress, and worries before the pandemic (retrospective), during the national lockdown in spring 2020 (retrospective), and currently. In addition, in November 2020 we

invited the same mothers to respond to the same questionnaire again. By using reports from all four time points, we are able to explore how the pandemic affected Norwegian mothers over the course of the pandemic year 2020.

A small part of the present data was used in an earlier paper (Thorsteinsen, Parks-Stamm, Kvalø, Olsen & Martiny, 2022). In the earlier paper, we used a subsample of the present data (i.e., mothers who cohabited; $n = 180$), only from the first data collection point (June 2020) and focused on the correlates of mothers' gender ideology. The present research extends this earlier work by investigating the full sample of 231 mothers who responded to the online questionnaire in June 2020 and including a second time point of data collection in November 2020. In the present work, we focus on well-being across the pandemic year, pandemic-related worries, and stress.

We examine the following preregistered research questions and hypotheses (https://osf.io/auxhj): The first research question focused on how maternal well-being developed over the early course of the pandemic: How did the well-being of Norwegian mothers change throughout the pandemic year 2020 (RQ1)? We hypothesized that mothers' well-being was lowest during the nation-wide lockdown in March/April compared to the time before the lockdown, the time of reopening in June 2020, and November 2020 (H1). Next, we aimed at investigating the effects of family variables that earlier research had identified to relate to maternal well-being. More precisely, we asked whether specific family variables (income, family structure, age of youngest child) were related to mothers' well-being throughout the pandemic year 2020 (RQ2). We hypothesized that lower income (H2) and single parenthood (H3) were negatively related to maternal well-being and that age of youngest child (H4) was positively related to maternal well-being. Next, we turned to the relationship between maternal stress and well-being and hypothesized that mothers' level of stress during the lockdown would be negatively related to their well-being during lockdown (H5) and at later points in time (H6). In addition, we hypothesized that lockdown stress would mediate the relationship between family structure and lockdown well-being (H7). Finally, we hypothesized that mothers' pandemic-related worries (general and financial worries) in November would be negatively related to their well-being in November (H8) and that financial worries would mediate the relationship between income and well-being in November (H9)[1].

METHOD

Procedure

The data collection took place in June 2020 and November 2020 through an online questionnaire. Data were collected by contacting principals from 266 elementary schools across Norway. Of these, 40 principals confirmed that they would distribute the invitation link to parents of the targeted group (parents with children in elementary school, aged 6–13 years). Parents were asked to give informed consent before filling out the questionnaire[2]. The parents who participated in the first data collection were contacted again in November 2020 and invited to fill out the same questionnaire again. The project was registered at the Norwegian Centre for Research Data (Ref. 164246) and received ethical approval (Ref. 2017/1912) from the internal board of research ethics at the first author's institution.

Participants

In June 2020, 273 parents completed the questionnaire. Of these participants 231 were women with a mean age of 40.09 ($SD = 6.22$), and only 31 were men (two participants chose the category other/does not want to respond and nine participants did not report gender). Because the number of fathers was so small, we decided to only focus on the mothers. In November 2020, 109 parents responded again (mean age = 41.23, $SD = 6.06$). We matched participants by asking them to generate a unique anonymous code in the questionnaires in June and November. In the few cases ($n = 6$) in which participants did not report the same code twice, we manually matched participants based on demographic information. Those we could not unambiguously match ($n = 3$) were excluded when analyzing the data from November 2020. Of the 109 parents who responded again, 11 were fathers and 98 were mothers. We were able to match 97 mothers (mean age = 40.58, $SD = 5.66$) to the responses from the first data collection in June, and it is these 97 mothers we included when analyzing data from November 2020.

Measures

The survey text was in Norwegian. All measures used in the analyses are reported both in English and Norwegian in the Supplemental Material and can be found here: https://osf.io/vum62.

Parent well-being. Parent well-being was measured using the Norwegian version of the 5-item WHO-5 Well-Being Index (Topp, Østergaard, Søndergaard & Bech, 2015). The index is a well-established and reliable measure of well-being (Sischka, Costa, Steffgen & Schmidt, 2020) that contains five positive statements, such as "I have felt calm and relaxed," evaluated on a scale from 0 (none of the time) to 5 (all of the time). In line with past research, the raw sum score (with a range of 0–25) was multiplied by four so that the final score could range from 0 (absence of well-being) to 100 (maximum well-being). Participants were asked to recall their well-being before the pandemic started (T1, retrospective), i.e., "Reflect on your emotions prior to the shutdown of society" ($\alpha = 0.88$) and during the lockdown of society when schools were closed (T2, retrospective), i.e., "Reflect on your emotions during the period when schools were shut down" ($\alpha = 0.89$). They then reported their current well-being in June 2020 after schools reopened (T3), i.e., "Reflect on the emotions you experienced immediately following the reopening of schools" ($\alpha = 0.91$) and in November 2020 (T4), i.e., "Share your emotional experiences from the past month" ($\alpha = 0.89$).

Pandemic related stress and worries. We also measured participants' stress during lockdown and their general and financial worries related to the pandemic. Lockdown stress was measured retrospectively with five self-developed items such as "I felt generally stressed during lockdown" and "I felt stressed combining work and homeschool" in June 2020 ($\alpha = 0.71$). General worries were measured with three self-developed items, e.g., "Are you worried about how the pandemic is developing?" and "Are you anxious about negative consequences of the pandemic?" in November 2020 ($\alpha = 0.91$). Finally, the financial worries were measured with two self-developed items, "Are you worried about losing your job because of the pandemic?" and "Are you worried about your household's financial situation due to the pandemic?" in November 2020 ($r = 0.62$, $p < 0.001$). For lockdown stress participants responded on a 5-point Likert scale from 1 = strongly disagree to 5 = strongly agree. For general and financial worries they responded on a 7-point Likert scale from 1 = not at all to 7 = to a large extent.

Demographics. Demographic data were collected covering a range of variables, including age, gender, income level, occupation, weekly working hours, number of siblings, risk group status, and family composition, among others. The primary variables of interest for our analysis were income level, family structure, and the age of the youngest child. Income levels were categorized into five groups for the purpose of the study: 1 = NOK 0–320,000; 2 = NOK 320,000 – 460,000; 3 = NOK 460,000 – 1,200,000; 4 = NOK 1,200,000 – 2,000,000; 5 = Over NOK 2,000,000. Participants selected the category that best represented their income. Participants who only responded in June (231 mothers) had a mean income level of 2.46 ($SD = 0.79$), while those who responded both in June and November (97 mothers) had a mean income level of 2.48 ($SD = 0.79$).

To measure family structure, we asked the participants about their marital status, 1 = single (Norwegian: singel), 2 = in a relationship but not living together (Norwegian: i et forhold, men bor ikke i lag), 3 = in a domestic partnership (Norwegian: samboer), 4 = widow/widower (Norwegian: enke/enkemann) or 5 = married (Norwegian: gift). In Norwegian, the term "samboer" is commonly used when referring to a romantic partner one lives with and earlier research shows that the presence of children affects the relationship quality of cohabitors and married parents in a similar and positive way in Norway (Hansen, Moum & Shapiro, 2007). This led to a variable in which 0 = single parent (including categories 1, 2 and 4) and 1 = not single parent (i.e., category 3 and 5). In the sample that only responded in June (231 mothers), we had 50 mothers who were a single parent and 181 who lived with their partner or were married. In the sample that responded both in June and November we had 19 who were single and 78 mothers that lived with their partner or were married. For the age of the youngest child in the family, the youngest child of participants in June had the average age of 7.81 (age range 0–13.42 years, $SD = 3.36$), and for those who participated in both June and November the youngest child was on average 7.50 years old (age range 0.08–13.17 years, $SD = 3.50$).

Sensitivity analyses

We conducted a post hoc sensitivity analysis with G* Power to investigate the size of effects we were able to detect given a power of 0.95. For the repeated measures ANOVA that investigated development of well-being during the pandemic (RQ1) with the one group of participants that responded at both time points ($N = 97$), four measurements, correlation among repeated measures set to $r = 0.50$, and nonsphericity correction $\varepsilon = 0.869$, we were able to detect an effect size of $f^2 = 0.16$ which is considered a small effect (Faul, Erdfelder, Lang & Buchner, 2007).

Statistical analyses

We used SPSS 29 for all analyses, which included descriptive statistics, correlation matrices, repeated measures ANOVA, and linear regression analyses. To answer how mothers' well-being changed throughout the pandemic year 2020 (RQ1), we ran a repeated measures ANOVA with a Huyn-Feldt correction with time as the repeated-measures factor. Second, to investigate if specific family variables, H2-H4 (income, family structure, and age of youngest child) were related to mothers' well-being throughout the pandemic year 2020 (RQ2), we ran three separate linear regression analyses for the three time points after the outbreak of the pandemic — i.e., during lockdown, at reopening in June, and in November – while controlling for pre-pandemic well-being and mothers' age. All family variables –income, family structure, and age of youngest child– were included as predictors in each of the linear regression analyses.

Then, to test our hypotheses that mothers' level of stress during lockdown would be negatively related to well-being during lockdown (H5) and at later points (H6), we ran three linear regression analyses with mothers' well-being at the different time points as outcome variables, and stress during lockdown as the predictor, controlling for mothers' well-being before the pandemic. To test H7, that lockdown stress levels would mediate the relationship between family structure and lockdown well-being, we used Hayes (2018) PROCESS Macro (version 4.2, Model 4, 10,000 bootstrap samples). Marital status was entered as the predictor (X), well-being during lockdown as the outcome (Y), and stress during lockdown as the mediator (M). Well-being before the pandemic was included as covariate. To test H8, if mothers' pandemic related worries (general and financial) in November were negatively related to their well-being in November, we conducted a linear regression analysis with well-being in November as the outcome variable and financial worries and

general worries as predictor variables, controlling for well-being before the pandemic. Finally, to test H9, whether financial worries explained the relationship between income and well-being in November, we conducted a mediation analysis using Hayes (2018) Process Macro (version 4.2, Model 4, 10,000 bootstrap samples). Income was entered as the predictor (X), well-being in November as the outcome (Y), and financial worries as the mediator (M). Well-being before the pandemic was included as covariate.

RESULTS

Means, standard deviations, and correlations for all relevant variables for the full sample of 231 mothers can be found in Table 1. The following analysis included the 97 mothers who responded at both time points (i.e., mean values for this subsample differ from the full sample reported in Table 1). First, we tested RQ1, which focused on how mothers' well-being changed throughout the pandemic year 2020, including reports from the four time points. The repeated measures ANOVA with a Huyn-Feldt correction including the 97 participants showed that mothers' well-being did not significantly change over time, $F (2.61, 250.31) = 1.42$, $p = 0.241$, $\eta^2 p = 0.02$. However, pairwise comparisons of means showed that well-being in November ($M = 55.88$, $SD = 21.81$) was significantly lower than before the pandemic ($M = 59.96$, $SD = 19.81$, $p = 0.041$) 95% CI [.174; 7.99]. We hypothesized (H1) that well-being during lockdown would be the lowest, and although the means trended in this direction ($M = 57.49$, $SD = 21.91$), the well-being during the lockdown was not significantly lower than the well-being in November ($p = 0.501$), 95% CI [−3.12; 6.34]. See Fig. 1 for the development of mothers' well-being throughout the pandemic year 2020.

The relationship between family variables and mothers' well-being

Results from the three separate linear regression analyses for RQ2 and H2-H4, are presented together in Table 2. During lockdown (231 mothers), only income was significantly related to the change in well-being from pre-lockdown to during lockdown, where higher income was associated with greater decreases in well-being. At reopening (231 mothers), only the age of the youngest child was significantly related to the change in well-being between pre-lockdown and reopening, where having younger children was associated with greater decreases in well-being. Age of the youngest child was also significantly related to the change in well-being from pre-lockdown to well-being in November (including 97 mothers)[3], where having younger children was associated with a larger decrease well-being.

The relationship between mothers' lockdown stress and their well-being

Analyses of H5 showed that mothers' level of stress during lockdown was significantly negatively related to their well-being during lockdown, $R^2 = 0.47$, $F(2, 227) = 100.53$, $b = −11.74$, $p < 0.001$, controlling for well-being before the pandemic. We further tested if mothers' level of stress during lockdown was negatively related to their well-being at reopening and in November (H6). We did two separate linear regression analyses, one for each time point, while controlling for well-being before the pandemic. Lockdown stress was significantly negatively related to the change in well-being at reopening (including 231

Table 1. *Correlations and descriptive statistics of all relevant measures*

		M	SD	N	1	2	3	4	5	6	7	8	9	10	11
1. Age	40.09	6.22	231	1										
2. Marital status	0.78	0.41	231	0.06	1									
3. Income	2.46	0.79	230	0.18**	0.22**	1								
4. Age of youngest child	7.81	3.36	230	0.57**	−0.06	0.09	1							
5. Well-being before the pandemic	62.72	19.72	231	0.24**	0.09	0.12	0.17**	1						
6. Well-being during lockdown	58.51	21.50	231	0.14*	0.05	−0.07	0.18**	0.39**	1					
7. Well-being during reopening	59.72	20.32	231	0.17**	0.12	0.10	0.21**	0.73**	0.56**	1				
8. Well-being in November	55.88	21.81	97	0.15	0.05	0.11	0.36**	0.57**	0.41**	0.68**	1			
9. Lockdown stress	2.63	1.06	230	−0.10	−0.04	0.16**	−0.18**	0.03	−0.56**	−0.16*	−0.14	1		
10. Pandemic general worries	4.66	1.62	97	−0.19*	−0.05	−0.30**	−0.14	−0.29**	−0.40**	−0.35**	−0.34**	0.34**	1	
11. Financial worries	2.51	1.80	97	−0.10	−0.12	−0.33**	−0.21*	−0.17	−0.31**	−0.37**	−0.43**	0.24*	0.50**	1

*$p < 0.05$.
**$p < 0.01$.
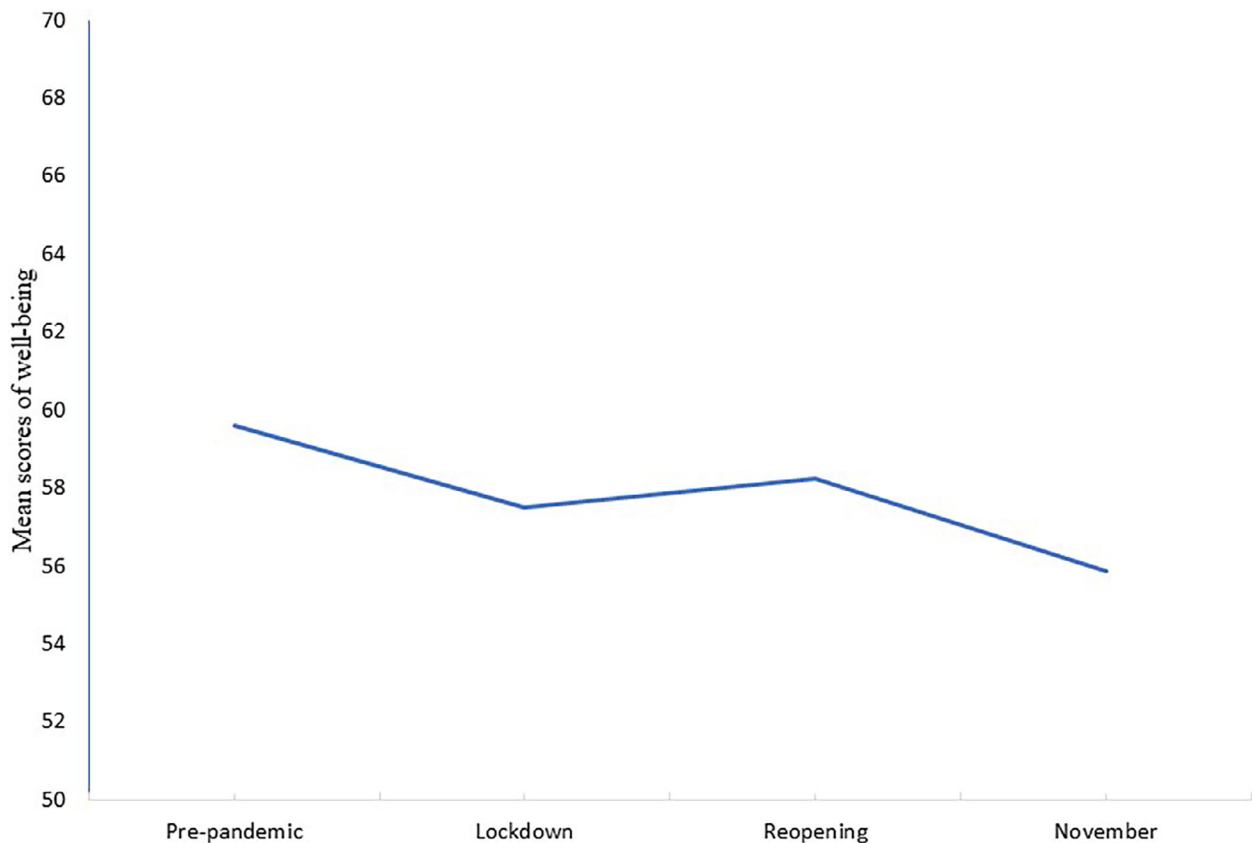
Fig. 1. The development of mothers' well-being throughout the pandemic year (*N* = 97). Note: The scale starts at 0 (absence of well-being) and ends at 100 (maximum well-being).

Table 2. *Summary of results of the linear regression for family-level variables as predictors of well-being during lockdown, well-being at reopening in June, and well-being in November*

	Lockdown well-being				Reopening well-being				November well-being			
	β	*t*	*df*	*p*	*β*	*t*	*df*	*p*	*β*	*t*	*df*	*p*
Age of youngest child	0.13	1.81	228	0.072	0.17	2.91	228	0.004	0.22	2.21	96	0.029
Income	−0.16	−2.47	228	0.014	−0.01	−0.13	228	0.901	−0.11	−1.26	96	0.210
Marital status	0.08	1.25	228	0.213	0.09	1.87	228	0.063	0.10	1.19	96	0.238

Note: For all analyses pre-pandemic well-being and mothers' age was used as control. *β* = standardized regression coefficient.

mothers), $R^2 = 0.53$, $F(2, 227) = 125.79$, $b = -3.45$, $p < 0.001$. The association between lockdown stress and the change in well-being in November (including 97 mothers) was still negative, but not statistically significant, $R^2 = 0.34$, $F(2,94) = 23.93$, $b = -2.42$, $p = 0.180$. The mediation model (Model 4, 10,000 bootstrap samples, Hayes, 2018) that we used to test whether lockdown stress levels mediated the relationship between family structure and lockdown well-being (H7), included 231 mothers and is reported in Table 3. The analyses did not show a significant direct effect of family structure on lockdown well-being 95% CI [−4.00; 5.92]. Furthermore, the bootstrapped confidence interval for the indirect effect of family structure included zero, 95% CI [−2.35; 5.45], meaning that lockdown stress did not mediate the relationship between the family structure and lockdown well-being.

The relationship between mothers' pandemic related worries and well-being in November

The analyses testing H8 (including 97 mothers) are reported in Table 4 and showed that mothers' financial worries were significantly negatively related to mothers' well-being in November controlling for their pre-pandemic well-being, but general pandemic related worries were not. The mediation model used to test H9, reported in Table 5, showed a negative direct effect of income on well-being 95% CI [−11.03; −2.00]. However, income was negatively related to financial worries, 95% CI [−1.18; −0.27] and financial worries were negatively related to mothers' well-being in November, 95% CI [−6.86; −2.99], resulting in a significant positive indirect effect of income on well-being via financial worries, as the bootstrapped confidence interval for the indirect effect of income on well-being via

Table 3. *Mediation model for the relationship of family structure to lockdown well-being via lockdown stress (N = 230)*

		Lockdown stress (M)				Lockdown well-being (Y)		
		Coeff. [LLCI; ULCI]	SE	*p*		Coeff. [LLCI; ULCI]	SE	*p*
Family structure (X)	a	−0.15 [−0.48;0.19]	0.17	0.396	c'	0.96 [−4.00;5.92]	2.52	0.703
Pre-pandemic well-being		0.00 [−0.01;0.01]	0.00	0.577		0.41 [0.31;0.51]	0.05	<0.001
Lockdown stress (M)					b	−11.72 [−13.65; −9.79]	0.98	<0.001
		$R^2 = 0.00$				$R^2 = 0.47$		
		$F(2,227) = 0.48$				$F(3,226) = 66.82$		<0.001

Note: Confidence intervals are displayed at the 95% level. a = the effect of the independent variable on the mediator variable, controlling for pre-pandemic well-being, b = the effect of the mediator variable on the dependent variable, controlling for the independent variable and pre-pandemic well-being, c' = the direct effect of the independent variable on the dependent variable, controlling for the independent variable and pre-pandemic well-being, X = the independent variable, M = the mediator variable, Y = the dependent variable.

Table 4. *Results of a linear regression model with November well-being as dependent variable and pandemic-related general worries and pandemic-related financial worries as predictors controlling for pre-pandemic well-being (N = 97)*

	b	*SE (B)*	*β*	*t*	*p*
Pre-pandemic well-being	0.56	0.09	0.51	6.18	<0.001
Pandemic general worries	0.05	1.30	0.00	0.04	0.972
Pandemic financial worries	−4.08	1.14	−0.34	−3.58	<0.001

financial worries did not include zero, 95% CI [0.97, 6.84]. Thus, income has a positive effect on well-being through financial worries (as greater income is associated with less financial worries and therefore greater well-being) but a negative effect on well-being when this route is not taken into account.[4]

DISCUSSION

In this study, we investigated which factors predicted changes in Norwegian mothers' well-being over the course of the pandemic. We started by examining the temporal development of well-being over the course of the pandemic and found that the level of maternal well-being in November was significantly lower than the maternal well-being before the pandemic, although the change over the full period (also including lockdown and reopening) did not significantly change. We then examined which variables were related to changes in maternal well-being over time. Of the family-related variables, we found that income was associated

with a decrease in maternal well-being during the lockdown, while the age of the mother's youngest child was associated with lower levels of wellbeing at reopening in June 2020 and in November 2020. We found that the additional stress mothers felt during the lockdown was strongly associated with their reported well-being both during the lockdown and in June 2020. Finally, mothers' financial pandemic-related worries were negatively related to their well-being in November 2020.

When we examine responses for the lockdown, the only family-level variable that significantly predicts maternal well-being is income; mothers with higher individual income reported significantly lower well-being. Importantly, we found this effect when controlling for earlier well-being, which means that this group of mothers had the greatest decline in well-being. At first sight, this is a rather surprising finding, as some studies conducted during the pandemic have found low-income people and particularly low-income parents suffered more from anxiety and depression (e.g., Hall, Sanchez, de Graca, Bennett, Powers & Warren, 2022; Kerr, Rasmussen, Fanning & Braaten, 2021; Özmen, Özkan, Özer & Yanardağ, 2021). However, other research also found that those with the highest socio-economic status reported the greatest decrease in well-being during the pandemic compared to pre-pandemic levels (Wanberg, Csillag, Douglass, Zhou & Pollard, 2020). It might be the case that mothers in Norway who had better-paying jobs were more negatively affected by the lockdown of society than those with lower levels of income because they had more responsibility at work and longer working hours, so that it might have been particularly difficult for them to

Table 5. *Mediation model for the relationship of income to November well-being via financial worries (N = 97)*

		Financial worries (M)				Well-being in November (Y)		
		Coeff. [LLCI; ULCI]	*SE*	*p*		Coeff. [LLCI; ULCI]	*SE*	*p*
Income (X)	a	−0.72 [−1.18; −0.27]	0.23	0.002	c'	−6.51 [−11.03; −2.00]	2.27	0.005
Pre-pandemic well-being		−0.01 [−0.03; 0.01]	0.01	0.348		0.62 [0.45; 0.79]	0.09	<0.001
Financial worries (M)					b	−4.92 [−6.86; −2.99]	0.98	<0.001
		$R^2 = .13$				$R^2 = .48$		
		$F(2,94) = 6.97$		0.002		$F(3,93) = 28.38$		<0.001

Note: Confidence intervals are displayed at the 95% level. a = the effect of the independent variable on the mediator variable, controlling for pre-pandemic well-being, b = the effect of the mediator variable on the dependent variable, controlling for the independent variable and pre-pandemic well-being, c' = the direct effect of the independent variable on the dependent variable, controlling for the independent variable and pre-pandemic well-being, X = the independent variable, M = the mediator variable, Y = the dependent variable.

additionally be responsible for children's care and education while working from home. In line with this, post-hoc correlational analyses showed that in the present data, income and workhours were positively correlated ($r = 0.60$, $p = <0.001$). This reasoning is in line with the significant negative association we found between mothers' level of stress during lockdown and their well-being. These findings suggest that income alone cannot ensure well-being during a crisis.

Interestingly, we did not find a relationship between marital status (i.e., single parent vs. non-single parent) and mothers' well-being at any of the time points. With the present data, we can only speculate about why single parenthood did not predict maternal well-being in our sample. First, previous research has highlighted Norway as a country that does not have a strong two-parent norm, and therefore the typical negative association between single-parent status and well-being might not be present (Stavrova & Fetchenhauer, 2015). Second, as a large percentage of divorced couples in Norway share custody (43% had shared custody in 2020; SSB, 2022), many single parents were able to share the stress and responsibility associated with parenthood during the pandemic with their former partner. Unfortunately, we are unable to differentiate between single mothers with involved ex-partners who shared some of the responsibility for the child and those with ex-partners who were not involved in the upbringing of the child. In addition, the small number of single mothers in our study reduced statistical power. Further research investigating parental well-being in times of crisis should oversample vulnerable groups such as single parents.

The present study builds on previous research documenting a decrease in maternal well-being by identifying the factors associated with decreases in maternal well-being after the lockdown. We found that lockdown stress seemed to have a carry-over effect, predicting decreases in maternal well-being after the lockdown was over. In addition, we found that the age of the youngest child was positively related to the change in maternal well-being, meaning that the older the youngest child was, the higher well-being the mothers reported, even months after the lockdown ended. This finding is consistent with previous research that showed that parental stress relates to parental burnout (Skjerdingstad, Johnson, Johnson, Hoffart & Ebrahimi, 2022), and parents of younger children experienced more parental exhaustion (Marchetti, Fontanesi, Mazza, Di Giandomenico, Roma & Verrocchio, 2020) and stress (Giannotti, Mazzoni, Bentenuto, Venuti & de Falco, 2022) during the COVID-19 lockdown in Italy. In line with the transactional model of stress (Lazarus & Folkman, 1984), the additional stressors of young children, and having to combine working from home with childcare, seems to have overwhelmed mothers' resources.

Limitations

The present study contributes to new and important knowledge on how the pandemic was related to mothers' well-being in Norway, but some limitations need to be discussed. Due to the design of the present study, we cannot draw causal conclusions from our data. By using a longitudinal design with two time points, we were able to look at changes in relationships over time. However, collecting data at two time points leaves open the possibility for attrition, and in our study one of the main limitations is the loss of participants at the second data collection. This led to a substantial loss in statistical power in many of the analyses.

Furthermore, two of our measures in June were retrospective reports of participants' well-being. In line with Chang and Little (2018), we argue that collecting retrospective and present responses at the same time can provide good estimates of perceived change over time when that is the focus of the research (but see Schmitt & Di Fabio, 2005, for an opposing view). Little, Chang, Gorrall, et al. (2019) also argue that retrospective pretest-posttest designs can be useful because they aid participants to "gauge the degree of change that they experience with greater awareness and precision than a traditional approach" (p. 175). In the present work, our focus was on participants' subjective experience of their well-being and stress rather than objective values. For this reason, we believe that when interested in perceptions (rather than a "true effect"), retrospective assessments can be valuable (for a similar argument see Blome & Augustin, 2015).

Finally, some of the demographic variables were not measured in an optimal way. The income variable consisted of four categories, and 58.9% of mothers who responded in June and 60.8% of mothers who responded both in June and November belonged to the income category of NOK 460,000 – 1,200,000. This means that the majority of respondents belonged to one category. This reduced the variance and possibly indicates that this category was too broad; future research should use more fine-grained income categories or continuous income data.

Practical implications

By studying mothers in Norway over the course of the pandemic year 2020, the present research provides important information about which individuals may be particularly vulnerable to worries, stress, and reductions in well-being during societal lockdowns. More precisely, the present work showed that Norwegian mothers of elementary school children reported lower well-being during the pandemic than before, and that the age of their youngest child was related to declines in well-being. Moreover, results showed that mothers' levels of stress were negatively associated with their well-being during and after the lockdown. As parenting younger children was consistently associated with reduced maternal well-being during the pandemic —and this holds true even in one of the most gender-egalitarian countries in the world— governments should plan now for how to support mothers of young children when schools and childcare facilities are closed. Norway currently has some of the most generous family benefits in the world, including parental leave, government-supported childcare, *kontantstøtte* (childcare financial support), and *barnetrygd* (child payments). National statistics show that 87.7% of the children between the ages of 1 and 2 in Norway attend childcare institutions, and this percentage increases to 93.4% for children aged 1–5 (SSB, 2023). Therefore, when childcare is restricted because of a global health-related crisis, this will take a particular toll on the well-being of mothers with young children. Therefore, the government needs to expand programs that include contingency plans for working mothers when childcare is unavailable in times of crisis.

This also provides information for policymakers in other countries that look to Norway as a model nation in early childhood policies. Despite ranking in the top three countries for parental leave and early childhood education, mothers of young children in Norway also needed additional support during the pandemic. Policymakers must consider novel responses to supporting mothers of young children when (and if) social distancing is required.

CONCLUSION

This research contributes to a growing body of work documenting the consequences of the pandemic on mothers' well-being (Czymara, Langenkamp & Cano, 2021; Hertz, Mattes & Shook, 2021; Johnson, Skjerdingstad, Ebrahimi, Hoffart & Johnson, 2022; Racine, Eirich, Cooke *et al.*, 2022; Reme, Wörn & Skirbekk, 2022; Thorsteinsen, Heijens, Parks-Stamm, Froehlich & Martiny, 2024; Thorsteinsen, Parks-Stamm, Kvalø, Olsen & Martiny, 2022; Vicari, Zoch & Bächmann, 2022). In this study, we investigated the development of mothers' well-being during the pandemic, and different factors related to maternal well-being in times of crisis in a modern welfare state. We found that mothers' well-being changed during the pandemic year 2020, but there was only a significant difference between pre-pandemic well-being and well-being in November 2020. We also saw that the family-related variables were related to well-being differently at the four time points, with the age of the youngest child showing the strongest and most consistent relationship with maternal well-being. Through a longitudinal design including both retrospective and real-time assessments, the present work provides a unique perspective on the challenges faced by Norwegian mothers during the COVID-19 pandemic, highlighting the most influential factors in their changing well-being over time.

CONFLICT OF INTEREST

No conflicts of interest.

DATA AVAILABILITY STATEMENT

Data and code is available on Open Science Framework (https:// osf.io/4frk2/).

ENDNOTES

[1] Hypothesis 7 is listed as Hypothesis 8 in the preregistration, and Hypothesis 8 is listed as Hypothesis 7 in the preregistration. In order to improve readability, we changed the order reported in the manuscript.
[2] After completing the questionnaire, parents received a link to a children's questionnaire. The responses of the children are not reported in the present paper (for the results of the children see Martiny, Thorsteinsen, Parks-Stamm, Olsen & Kvalø, 2021; Thorsteinsen, Parks-Stamm, Olsen, Kvalø & Martiny, 2021).
[3] We ran the same regression again, but instead used income as reported in November. Income was still not a significant predictor, $b = -.27$, $p = .817$.
[4] To ensure complete responses on the income variable, we used income as measured in the June data collection. The measure used in June consisted of broad categories, while the one used in the November data collection had more categories to choose from and therefore participants could more specifically report their income. We ran the mediation model of H9 again, but used income as measured in November instead. In this model, the indirect effects hold, 95% CI [.59; 2.73], but the direct effect does not, 95% CI [−3.82; 0.69].

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