**Working parents,
financial insecurity, and childcare: mental health in the time of COVID-19**

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Working Parents, Financial Insecurity, and Childcare: Mental Health in the Time of COVID-19 in the UK

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Abstract

The COVID-19 pandemic and the policy measures to control its spread – lockdowns, physical distancing, and social isolation – have coincided with the deterioration of people's mental well-being. We use data from the UK Household Longitudinal Study (UKHLS) to document how this phenomenon is related to the situation of working parents who now have to manage competing time demands across the two life domains of work and home. We show that the deterioration of mental health is worse for working parents, and that it is strongly related to increased financial insecurity and time spent on childcare and home schooling. This burden is not shared equally between men and women, and between richer and poorer households. These inequalities ought to be taken into account when crafting policy responses.

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1 Introduction

Work–life balance is important for individual well-being, and the spheres of employment and home ideally should not overlap (Robinson, 2006). However, the public policy response to the COVID-19 pandemic in the United Kingdom necessitated major changes to this separation as the government closed schools, most public places and transport, and many businesses. These policies meant that as of 26 March 2020, schooling was to take place at home. While many schools carried out teaching and learning activities online, they were reliant on parents to ensure the continuation of these programs. Individuals with children were forced into an involuntary amalgamation of their two life domains, all the while living under an enforced lockdown, social isolation, and the fear – or the consequence – of losing their jobs. Even individuals without children had to make adjustments as those who could work from home did so by setting up temporary home offices in kitchens and bedrooms.

The enforced social isolation adopted by the UK and several other governments around the world as a response to COVID-19 have coincided with the deterioration of people's mental health (Banks and Xu, 2020; for evidence from the US, see Adams-Prassl et al., 2020). Being in quarantine raised feelings of fear, nervousness, anger, grief, and anxiety-driven insomnia similar to the experiences of the Ebola and SARS outbreaks in the late 1990s and early 2000s (Reynolds et al., 2008; Desclaux et al., 2017; Caleo et al., 2018). The fears associated with the pandemic were compounded by the closure of schools and the shutdown of many workplaces, and the ensuing massive loss of employment even if layoffs were temporary.

The deterioration in mental health during the COVID-19 lockdown and the increased pressure on the household's financial resources associated with the policy response are not unrelated. Financial loss increases emotional and psychological stress and lowers health status (Grafova, 2015; van Hal, 2015), especially during economic crises (Friedman and Thomas, 2009; Kondilis et al., 2013; Mucci et al., 2015). Financial uncertainty can lead to increased levels of stress and allostatic load – the effect of chronic exposure to stress on the body – which negatively affect health and behaviour such as increased rates of smoking or drinking (Grafova and Monheit, 2019). Research has also shown that stress due to the sudden change in available resources and potential risk of material hardship generates distinct effects among men and women (Breunig, et al., 2007; Kukk, 2019). The most severe effects are experienced in households with children (Cobb-Clark and Ribar, 2012), especially if their net worth is below the median value (Gallo et. al., 2006; Leung and Lau, 2017).

Social isolation, job losses, working from home, and home-schooling generated competing time demands and financial concerns that also contributed to reduced productivity as shown by research on previous pandemics where individuals reported suffering from increased depression and anxiety because of social distancing (Brooks et al., 2020). Depression alone, for example, was estimated to have led to 200 million lost working days each year at the cost of USD 30–40 billion (Gabriel and Liimatainen, 2020). High levels of stress can lead to mental and physical illness, aggressive and violent behaviour, alcohol abuse, and decreased work performance (Cohen and Willis, 1985; Whitley and McKenzie, 2005).

In this paper, we aim to unpack the link between financial security, working from home, and childcare as a result of the COVID-19 pandemic and the lockdown policies introduced in March 2020. In particular, we (1) document the damage to the financial security of working parents during the first wave of the COVID-19 pandemic in the UK; (2) explain the relationships between financial insecurity and the homecare of children and the mental well-being of working parents; and (3) explore the heterogeneity of these relationships across gender and economic status among working parents.

To do so, we use data from the UK Household Longitudinal Study (UKHLS), otherwise known as Understanding Society, which has been collecting information on UK households since 2009. Beginning on April 2020, a COVID-19 special survey has been running to examine the impact of the pandemic on the participants of UKHLS. Using this dataset, we are able to compare working parents to workers without children, i.e., workers who are likely to be under less pressure to reallocate time between home (including childcare) and work life.

We contribute to the literature in a number of ways. First, our study is the first focus on the well-being of working parents during the COVID-19 pandemic using high-quality longitudinal data. In particular, we use pre-COVID-19 information to control for pre-existing characteristics of working families. Second, in examining the well-being of working parents, we pay special attention to financial insecurity and childcare and home-schooling responsibilities. Third, we demonstrate that the burden between men and women, and between rich and poor households, are distinctly unequal. Since this heterogeneity exists in the distribution of burden, targeting both financial and non-financial aid can lead to more efficient and equitable outcomes.

2 Data and Descriptive Statistics

Our analysis is based on Wave 9 of the UK Household Longitudinal Study (UKHLS) and the April and May 2020 waves of the UKHLS COVID-19 survey. Wave 1 of the UKHLS, which started in 2009–2010, included around 40,000 households in the United Kingdom, collecting information on a range of socioeconomic and behavioural domains. Wave 9 (pre-COVID-19) consists of individuals surveyed during the period 2017–2018.

On April 2020, selected respondents of the UKHLS were invited to take part in the first wave of the new COVID-19 special survey, which includes important questions on the impact of the pandemic on the well-being of individuals, families, and wider communities. Participants were asked to complete one survey per month until July 2020, followed by a survey every two months from September 2020 in order to track changes in their circumstances and environments. There were 17,452 individuals who completed a full post-COVID-19 survey in April 2020, and 14,811 individuals completed the survey in May 2020 (Institute for Social and Economic Research, 2020). We use data from the first two months of the survey. It includes information about, among others, caring responsibilities and family life, employment and financial situation, financial well-being, home schooling, and mental well-being.

We restrict the sample to individuals who work (either being employed or self-employed) and have non-missing information on important socioeconomic characteristics, including age, gender, family structure, the region of residence, education, employment, and household income. Individuals are defined as a working parent if the person is employed or self-employed and lives with a child younger than 18 years old. We do not distinguish among natural, adoptive, and stepparents. There are 6,795 (43%) working parents in the estimation sample, of which 57% are female. The final estimation sample consists of over 15,500 observations of individuals who completed at least one post-COVID-19 survey. We show proportions and means of important characteristics in Table 1.[1]

[Table 1]

Mental health is measured using the General Health Questionnaire (GHQ). The GHQ Caseness score is constructed from the responses to 12 questions covering feelings of strain, depression, inability to cope, anxiety-based insomnia, and lack of confidence. The 12 answers are combined into a total GHQ score that indicates the level of mental distress, giving a scale running from 0 (the least distressed) to 12 (the most distressed). In Table 2, we show that working individuals were, on average, less mentally distressed before COVID-19. We find the same results if the sample is restricted to working parents only.

[Table 2]

In order to broadly capture financial insecurity, we consider seven indicators as follows (Table 2):

[1] Our focus is on working parents. However, for completeness and at the request of an anonymous reviewer, we run separate regressions over all individuals (i.e., working and non-working), including a model which includes an interaction between parental status and employment before the pandemic. The results from these regressions – presented in the appendix – are consistent with the main findings.

1. Looking ahead, how do you think you will be financially a month from now: will you be better off, worse off, or about the same?
2. Have you asked your bank for a mortgage holiday?
3. Have you applied for/received a payment holiday on any credit product other than a mortgage?
4. Have you given financial help to, or received financial help from, family or friends who do not currently live in the same house?
5. Have you applied for Universal Credit[2] (asked if not already receiving it in January or February 2020)?
6. If your household is now earning less than in January or February 2020, did you borrow from a bank or use a credit card to deal with this?
7. How likely it is that you will have difficulties in paying your bills (in %)?

Only the first question on the respondent's expectation about her or his own financial situation in the future is asked before and after the COVID-19 pandemic started. Questions 3 and 7 were only asked in the May 2020 round of the COVID-19 special survey.

Table 2 shows that more working individuals expect their financial situation to be worse after COVID-19, both among those who are working and among the restricted sample of working parents only. For instance, the mental well-being of working parents worsened by 64% as the pandemic was unfolding. The survey shows that working parents are in worse mental health and are less financially secure – irrespective of which measure of financial insecurity is used – than the sample of working individuals (compare Columns 1 and 3 of Table 2).

The intensity of engagement in childcare or home schooling is captured by the time spent on these activities. Based on the empirical distribution of this variable, we create four groups of working parents (quartiles): those who spend less than an hour, those who spend between 1 to 7 hours, those who spend between 7 to 20 hours, and those who spend 20 hours or more per week on childcare or home schooling.

In Table 3, we show that about a third of working mothers spend more than 20 hours per week on these activities, but less than a quarter of working fathers spend a similar amount of time looking after or schooling their children. Over 30% of working fathers spend less than an

[2] Universal Credit is a social security payment in the United Kingdom designed to alleviate the financial situation of low-income households.

hour each week on childcare or home schooling. More than half of working parents with younger children (less than 5 years old) spend more than 20 hours per week on childcare or home schooling. Finally, there is a strong propensity among parents with a tertiary or higher qualification to engage in childcare or home schooling. Parents with low or no educational qualification tend to spend less than one hour per week in these activities.[3]

[Table 3]

3 Estimation

We estimate the parameters of the following model which controls for observable confounders:

$$Y_{it} = \alpha + \beta WP_{it} + \boldsymbol{\delta}'\mathbf{x}_{it} + \varepsilon_{it}, \qquad (1)$$

where Y_{it} represents an outcome pertaining to financial insecurity for individual i at time t, WP_{it} is an indicator of being a working parent, $\mathbf{x}_{it}$ is a vector of individual and family characteristics, and ε_{it} is the unobservable determinant of the outcomes that varies across i and t. The vector $\mathbf{x}_{it}$ includes variables such as age, ethnic group, gender, education, labour market activity at the COVID-19 waves and previous wave, marital status, gross household income before COVID-19, and region of residence.

Equation (1) operationalises the conceptual framework described in the introduction – that is, we expect working parents to experience greater financial distress relative to working non-parents because of the presence of children at home, the additional difficulties in reconciling work and family life, and the increased pressure on financial and family responsibilities, during a time of widespread insecurity. The dataset allows us to examine this relationship over different measures of financial insecurity.

[3] This finding is consistent with much of the literature examining the relationship between educational attainment and parental time spent with children. See, for example, Bianchi et al. (2004), Chalasani (2007), and Marsiglio (1991).

We also examine the relationship between financial insecurity, different levels of time spent in childcare or home schooling, and parental mental well-being by estimating the following model:

$$MH_{it} = \alpha + \beta_1 FI_{it} + \beta_2 TCH_{it} + \boldsymbol{\delta}'\mathbf{x}_{it} + \varepsilon_{it}, \quad (2)$$

where MH_{it} represents mental well-being for individual i at time t, FI_{it} is the index of financial insecurity constructed using factor analysis,[4] TCH_{it} is a variable representing hours spent in child care or home schooling (grouped into four categories based on the empirical distribution of the variable), $\mathbf{x}_{it}$ is a vector of individual and family characteristics, and ε_{it} is the error term. The vector $\mathbf{x}_{it}$ is the same as in Equation (1), with the addition of the GHQ-12 Caseness score at the last pre-COVID-19 survey (Wave 9), which is similar to the idea behind controlling for previous trends in mental health (Banks and Xu, 2020).

Estimating Equation (2) provides us with the relationship between financial insecurity and mental health while controlling for the time spent on childcare or home schooling. The latter is important since the increased demand on parental time by children is likely to be associated with mental distress, especially for those parents who are already experiencing financial insecurity. When making comparisons between different levels of financial insecurity and mental health, we control for time that is spent by parents on childcare and home schooling.

4 Results

Table 4 shows the OLS estimates of the associations between being a working parent and a series of measures of financial insecurity (Equation (1) in Sec. 3). The different outcomes, which are displayed as separate columns, are binary variables indicating financial distress.

[4] The index is standardised to have a mean of 0 and a standard deviation of 1. It was created using factor analysis using the answers of the respondents to five out of the seven questions regarding financial insecurity listed in Sec. 2. These questions were asked in both post-COVID-19 waves, and the remaining two were not. One factor with an eigenvalue greater than 1 is retained and is used to construct an index of financial insecurity. Factor loadings are reported in the appendix (Table A1).

Rows A to H correspond to eight different regressions, distinguishing different types of working parents according to when they were surveyed (pre- or post-COVID-19 waves) and the number and ages of their children. Panel B of Table 4 contains the regression results using the pre-COVID-19 wave, where only the first outcome appears and without the rest of the indicators for financial distress. Each coefficient estimate is from a separate regression with different types of working parents as the explanatory variable of interest.

[Table 4]

Irrespective of the measure of financial insecurity, working parents are more financially insecure relative to workers without children during the COVID-19 period (Panel A of Table 4). They are more pessimistic about their financial future (Column 1), and they are more likely to have received some sort of financial assistance such as a mortgage or credit holiday, loans, and transfer payments from the state via Universal Credit (Columns 2 to 5). When we restrict the sample to the pre-COVID-19 wave (Panel B), we observe no statistically significant difference in expectations about financial security between workers with and without children. We conclude that any changes in expectations regarding the financial futures of these two types of workers must have occurred after the start of the pandemic.

The overall picture shown in Table 4 demonstrates that working parents with more children and working parents with younger children (less than 5 years old) fared worse after COVID-19 as measured by indicators for financial well-being.

We further explore the heterogeneity of our findings by gender and income group in Table 5, where we show that both mothers and fathers experience the same changes in financial insecurity during the pandemic. Except for the probability of having a mortgage holiday (Cell B2; probably because mortgages are typically shared by a couple), all the point estimates are larger for mothers. This implies that mothers experienced relatively harsher financial hardship than fathers in the sample. Neither mothers nor fathers expected their financial situation to be worse when asked the question before the pandemic (Cells C1 and D1).[5]

[Table 5]

In Table 6, we group households by income before the pandemic. In particular, we create two groups based on whether the household was above or below the median income before the pandemic. Parents with a lower pre-pandemic income are particularly exposed to financial insecurity. Point estimates are larger for working parents whose income before the pandemic was below the median income relative to those whose income was above the median. Since Universal Credit was designed for low-income households, it is reassuring that the estimate is not statistically significant for those households with income above the median (Cell B5). Regardless of whether the household was above or below the median income before the pandemic, there was a deterioration about their future financial situation after the pandemic (compare Cells A1 to C1 and B1 to D1).

[Table 6]

The results presented in Tables 4, 5, and 6 indicate that the perceived financial security of working parents has deteriorated after the start of the pandemic. This change in circumstances is likely to be associated with the mental well-being of working parents. To explore this, we estimate the relationship captured by Equation (2) in Sec. 3 – that is, whether declining financial well-being is reflected in worsening mental health while controlling for other relevant factors, particularly the time spent on childcare and home schooling.

In Table 7, we show the corresponding coefficient estimates of Equation (2). The measure of mental health that we use is the GHQ-12 Caseness score, which goes from 0 to 12,

[5] Although not presented in the table, working mothers are 6.3 percentage points more likely to feel constantly under strain and 2.5 percentage points more likely to have lost sleep over worrying relative to working women with no children. The corresponding comparisons between working fathers and working men with no children do not show a statistically significant difference.

where higher numbers are associated with worse mental health.[6] The index of financial insecurity is constructed using factor analysis and the different measures of financial well-being described in Sec. 2. For ease of interpretation, the mean values of the GHQ-12 Caseness score for different subgroups are available in Table 2.

Overall, we see that a one-standard-deviation increase in the index of financial insecurity is associated with an increase in the Caseness score of 0.411 (Cell A1), which is equivalent to 13% of a standard deviation. To put this figure into perspective, this effect is higher than the effect of many other important variables, including mental health and employment status at previous wave, and household income.

Other studies have reported a similar relationship: an increase in anxiety, depression, and other negative feelings are connected with the financial difficulties and economic downturn associated with the pandemic and resulting isolation policies (Holmes et al., 2020; Academy of Medical Sciences, 2020). In these early days of the COVID-19 lockdown, mental health deteriorated significantly across the households in the UK (Chandola et al., 2020; Davillas and Jones, 2020) although non-cognitive skills, particularly self-efficacy, seem to predict psychological resilience (Johnston, Kung, and Shields, 2020). For Australia in particular, Broadway, Méndez, and Moschion (2020) use the Household, Income, and Labour Dynamics in Australia (HILDA) longitudinal survey as well as the recent *Taking the Pulse of the Nation* survey to show similar results for parents.

That financial insecurity predicts worsening mental well-being is true for both households below and above the median income in the pre-pandemic wave (Cells A2 and A3), as well as for both mothers and fathers in the sample (Cells A4 and A5). The relationship is stronger for poorer households and for fathers. Conti (2020) similarly showed that households

[6] We also use the GHQ Likert score (scale 0 to 36) as an alternative measure of mental well-being. The results – available in the appendix (Table A2) – do not change our substantive conclusions.

at the lower end of the income distribution experienced the worst effects with reference to stress levels.

Having children does not have a significant relationship with mental health. However, spending 20 or more hours per week on childcare or home schooling is associated with worsening mental health. Based on the whole sample, working parents who spend 20 hours or more on childcare or home schooling have a Caseness score that is higher by 0.525 (equivalent to 16% of a standard deviation) relative to individuals who spend less than one hour on the same child-related activity (Cell F1). Working parents whose household income are below the median (pre-pandemic) do not show a significant relationship between the time spent on childcare and home schooling and mental health.[7] Andrew et al. (2020) note that, during the lockdown, the amount of time devoted to paid work reduced to an average of 3 hours per day while that of housework increased to 9 hours per day.

Mothers and working parents whose income were above the median (pre-pandemic) exhibit the strongest relationship between child-related activities and mental health. That women are faring worse under the pandemic was confirmed by other studies (Etheridge and Spantig, 2020; Banks and Xu, 2020; Andrew et al. 2020). Mothers tended to find childcare more stressful than fathers (Roeters and Gracia, 2016), and this is confirmed by the larger coefficient estimate on "20 or more hours" (0.404 vs 0.580, Cells F4 and F5). With school closures, the learning materials have been delivered remotely, and it is likely that mothers have taken on the task of ensuring schooling is taking place at home. Working mothers were, in any case, more likely to have lost their jobs during the pandemic (Andrew et al., 2020). In addition, maternal time with children is largely invariant to macroeconomic conditions and fluctuations in the labour market (Bauer and Sonchak, 2017).

[7] We also estimated the relationship between the components of the GHQ-12 caseness score and the index of financial well-being and hours spent on childcare or home schooling. The results are presented in Table A3 of the appendix. Financial insecurity is significantly related to all components; the majority of the components are also significantly related to spending 20 hours or more on childcare or home schooling.

5 Conclusion

The COVID-19 pandemic necessitated a range of policy prescriptions enacted to preserve public health and to secure the future of the UK economy. Measures have included an economic lockdown, physical distancing both in private and in public, and – in extreme cases – complete self-isolation. On top of this, school closures have shifted a large part of the responsibility for children's education to parents within the home environment. This has all but obliterated the notion of a healthy work–life balance, where competing time demands and the sudden precariousness of their economic position have meant that working parents have had to endure financial distress and a deterioration of their well-being, especially their mental health.

We document the financial insecurity of working parents around the peak of the first wave of the COVID-19 pandemic in the UK. In addition, we examine their mental well-being as it relates both to their increased financial insecurity as well as the increased time spent on child-related activities, particularly childcare and home schooling. Our results show that working parents experience significantly higher levels of financial distress relative to working counterparts without children.

We also show that the post-pandemic burden of financial insecurity and worsening mental health is neither equally shared between men and women, nor between rich and poor households. Women are more substantially affected, which is congruent with the results of previous studies (Etheridge and Spantig, 2020). Poorer households are also worse off. Bayrakdar and Guveli (2020) note that poorer families send their children to schools which do not have adequate facilities to cater to the online learning environment.

The heterogeneous distribution of the post-pandemic burden implies that public policy decisions ought to account for these underlying inequities. Working parents, especially mothers, are experiencing a worse mental and financial position. The burden can be eased by amplifying support for childcare and home schooling, including nonfinancial assistance such as training in educational content delivery. The increased conflict between work and life domains, especially for those with children, can be mitigated by policies that acknowledge the varied circumstances in which households find themselves.

Our results strongly suggest that while the COVID-19 lockdown policies put in place by the UK government were well-intentioned, the ‘one-size-fits-all’ approach resulted in less effective measures for working families. As financial and mental distresses are not equally distributed across the populations, our results highlight that the most precarious groups of society are disproportionately more affected by mental distress. Addressing this imbalance requires a more targeted approach to policy and emergency management to ensure that the burden of home schooling and financial distressing is no worse than the mental health problems caused by COVID-19.

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Table 1. Descriptive Characteristics of the Estimation Sample

	Employed or Self-Employed	Working Parents
Female (%)	57.3	57.9
White (%)	89.2	86.6
Employed (%)	83.6	85.7
Self-employed (%)	13.01	11.2
Employed and self-employed (%)	3.4	3.1
Married (%)	75.6	87.2
Age (mean (s.d.))	47.01 (12.21)	43.1 (8.9)
Working parent (%)	43.3	NA
Working mothers (%)	25.1	57.9
Working fathers (%)	18.2	42.02
Degree or other higher qualification (%)	60.9	64.6
A levels (%)	20.6	19.7
General Certificate of Secondary Education (GCSE) (%)	13.9	12.6
Low or no educational qualification (%)	4.6	3.1
Children < 5 years old (%)	11.4	26.3
Children 5–15 years old (%)	30.8	71.2
Two children or more (%)	20.5	47.3
Three children or more (%)	4.1	9.5
Gross monthly household income at pre-COVID-19 wave Q1 (< £2,422) (%)	16.5	11.6
Gross monthly household income at pre-COVID-19 wave Q2 (£2,422 - £3,807) (%)	22.73	22.95
Gross monthly household income at pre-COVID-19 wave Q3 (£3,807- £5,771) (%)	29.01	31.5
Gross monthly household income at pre-COVID-19 wave Q4 (> £5,771) (%)	31.7	33.8
Observations	15,665	6,795

Table 2. Means and Percentages of Outcome Variables – Mental Health and Financial Insecurity

	(1) Employed or Self-Employed Individuals (During COVID-19)	(2) Employed or Self-Employed Individuals at Wave 9 (Pre-COVID-19)	(3) Working Parents (During COVID-19)	(4) Working Parents at Wave 9 (Pre-COVID-19)
Mental Health				
GHQ-12 (mean (s.d.))	2.62 (3.23)	1.58 (2.83)	2.72 (3.28)	1.66 (2.93)
Financial Insecurity (yes=1, no=0)				
Do you expect your financial situation to be worse in the future? (%)	16.2	12.2	17.9	11.9
Have you asked your bank for a mortgage holiday? (%)	6.6		9.5	
Have you applied for/received a payment holiday or any credit product other than a mortgage? (%)	4.9		6.6	
Have you given or received financial help to or from family or friends not living with you? (%)	4.5		5.6	
Have you applied for Universal Credit? (%)	3.7		4.4	
Did you borrow from a bank or use a credit card to deal with lower earnings from January/February 2020? (%)	1.9		2.6	
How likely is it that you will have difficulties in paying your bills? (%)	11.0		13.19	

Table 3. Parental Characteristics and Time Spent in Childcare/Home Schooling

	< 1 hour per week	1-7 hours per week	7-20 hours per week	> 20 hours per week
Working parents (%)	29.23	20.52	20.87	29.37
Non-working parents (%)	38.40	16.68	16.10	28.83
Working mothers (%)	27.87	16.97	21.33	33.83
Working fathers (%)	31.17	25.58	20.23	23.02
Non-working mothers (%)	34.42	16.07	17.43	32.08
Working parents with children < 5 years old (%)	15.17	13.03	17.68	54.12
Working parents with children 5-15 years old (%)	19.12	25.60	26.42	28.86
Parents with degree or other higher qualification (%)	23.89	20.90	21.07	34.15
Parents with A levels (%)	38.22	18.23	17.24	26.31
Parents with GCSE (%)	42.13	16.22	21.49	20.15
Parents with low or no educational qualification (%)	43.45	20.23	16.09	20.23

Table 4. COVID-19 and Financial Insecurity (Employed or Self-Employed)

	(1) **Expect subjective financial situation to be worse in the future**	(2) **Having a mortgage holiday**	(3) **Having a credit holiday[§]**	(4) **Has received financial transfers**	(5) **Has applied for Universal Credit**	(6) **Is borrowing from a bank or credit card to compensate for loss in earnings**	(7) **How likely it is that you will have difficulties in paying your bills (in %)?[§]**
Panel A - Post-COVID-19 waves							
A: Working parents	**0.027 (0.007)*** **	**0.036 (0.006)*** **	**0.021 (0.006)*** **	**0.017 (0.004)*** **	**0.0098 (0.0041)** **	**0.011 (0.003)*** **	**2.956 (0.575)*** **
B: Working parent with 3 or more kids	**0.073 (0.019)*** **	**0.054 (0.017)*** **	0.013 (0.016)	**0.037 (0.012)*** **	**0.019 (0.012)* **	**0.028 (0.010)*** **	**4.887 (1.450)*** **
C: Working parent with kids 5-15	**0.020 (0.008)** **	**0.031 (0.007)*** **	**0.018 (0.007)*** **	**0.013 (0.005)*** **	**0.0074 (0.0044)*** **	**0.010 (0.003)*** **	**2.759 (0.605)*** **
D: Working parent with kids < 5	**0.021 (0.011)* **	**0.041 (0.010)*** **	**0.024 (0.010)** **	**0.022 (0.007)*** **	**0.015 (0.007)*** **	**0.011 (0.005)** **	1.245 (0.867)
Observations	15,909	15,979	7,221	15,948	15,843	15,910	7,106
Panel B - Pre-COVID-19 Wave 9							
E: All working parents	0.010 (0.010)						
F: Working parent with 3 or more kids	-0.008 (0.021)						
G: Working parent with kids 5-15	-0.002 (0.010)						
H: Working parent with kids < 5	0.009 (0.013)						
Observations	9,430						

Notes: § = Outcomes observed at second COVID-19 wave only. Outcomes 2 to 7 are not observed at pre-COVID-19 waves. Standard errors are robust and clustered at individual level. Control variables: ethnic background, age, age square, gender, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Each coefficient estimate is from a separate regression with different types of working parents as the explanatory variable of interest. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 5. COVID-19 and Financial Insecurity by Gender (Employed or Self-Employed)

	(1) Expect subjective financial situation to be worse in the future	(2) Having a mortgage holiday	(3) Having a credit holiday§	(4) Has received financial transfers	(5) Has applied for Universal Credit	(6) Is borrowing from a bank or credit card to compensate for loss in earnings	(7) How likely it is that you will have difficulties in paying your bills (in %)?§
Panel A - Post-COVID-19 waves							
A: Working mothers	**0.026 (0.009)*** **	**0.031 (0.008)*** **	**0.019 (0.008)** **	**0.017 (0.006)*** **	**0.014 (0.005)*** **	**0.011 (0.004)*** **	**3.408 (0.746)*** **
B: Working fathers	**0.020 (0.010)* **	**0.032 (0.008)*** **	**0.018 (0.008)** **	**0.012 (0.006)** **	.0003 (0.005)	**0.007 (0.004)* **	**1.499 (0.763)** **
Observations	15,909	15,979	7,221	15,948	15,843	15,910	7,106
Panel B - Pre-COVID-19 Wave 9							
C: Working mothers	-0.001 (0.012)						
D: Working fathers	0.022 (0.013)						
Observations	9,430						

Notes: § = Outcomes observed at second COVID-19 wave only. Outcomes 2 to 7 are not observed at pre-COVID-19 waves. Standard errors are robust and clustered at individual level. Control variables: ethnic background, age, age square, gender, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Each coefficient estimate is from a separate regression with different types of working parents as the explanatory variable of interest. * p<0.1; ** p<0.05; *** p<0.01

Table 6. COVID-19 and Financial Insecurity by Income Group (Employed or Self-Employed)

	(1) Expect subjective financial situation to be worse in the future	(2) Having a mortgage holiday	(3) Having a credit holiday§	(4) Has received financial transfers	(5) Has applied for Universal Credit	(6) Is borrowing from a bank or credit card to compensate for loss in earnings	(7) How likely it is that you will have difficulties in paying your bills (in %)?§
Panel A - Post-COVID-19 waves							
A: Working parent with income < median	**0.034 (0.013)*****	**0.043 (0.010)*****	**0.032 (0.011)*****	**0.032 (0.009)*****	**0.018 (0.009)****	**0.013 (0.006)****	**4.165 (1.081)*****
Observations	6,252	6,276	2,824	6,264	6,176	6,251	2,773
B: Working parent with income > median	**0.024 (0.009)****	**0.031 (0.008)*****	**0.014 (0.007)****	**0.009 (0.004)****	0.005 (0.004)	**0.009 (0.003)*****	**2.368 (0.669)*****
Observations	9,657	9,703	4,397	9,684	9,667	9,659	4,333
Panel B - Pre-COVID-19 Wave 9							
C: Working parent with income < median	0.010 (0.013)						
Observations	3,682						
D: Working parent with income > median	-0.004 (0.010)						
Observations	5,748						

Notes: § = Outcomes observed at second COVID-19 wave only. Outcomes 2 to 7 are not observed at pre-COVID-19 waves. Standard errors are robust and clustered at individual level. Control variables: ethnic background, age, age square, gender, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Each coefficient estimate is from a separate regression with different types of working parents as the explanatory variable of interest. * p<0.1; ** p<0.05; *** p<0.01

Table 7. COVID-19 and Mental Health (Employed or Self-Employed)

	Mental Health GHQ-12 Caseness Score (0–12)					
	(1) **All sample**	**(2)** **Wave 9 Income < median**	**(3)** **Wave 9 Income > median**	**(4)** **Fathers**	**(5)** **Mothers**	**p-value for difference between mothers and fathers**
A: Index of financial insecurity	**0.411** **(0.033)*** **	**0.438** **(0.048)*** **	**0.376** **(0.045)*** **	**0.538** **(0.052)*** **	**0.335** **(0.041)*** **	0.0022
B: Children < 4 y.o.	0.020 (0.120)	-0.156 (0.199)	0.149 (0.152)	-0.219 (0.149)	0.234 (0.182)	0.0532
C: Children 5-15 y.o.	-0.106 (0.096)	0.268 (0.181)	**-0.254** **(0.112)** **	-0.117 (0.125)	-0.105 (0.144)	0.9488
D: 1-7 hours	0.131 (0.121)	-0.277 (0.223)	**0.327** **(0.144)** **	0.182 (0.158)	0.108 (0.184)	0.7606
E: 8-19 hours	**0.216** **(0.128)* **	-0.145 (0.233)	**0.382** **(0.153)** **	**0.325** **(0.174)* **	0.171 (0.186)	0.5465
F: 20 or more hours	**0.525** **(0.126)*** **	0.299 (0.231)	**0.595** **(0.149)*** **	**0.404** **(0.168)** **	**0.580** **(0.182)*** **	0.4769
Mental health at Wave 9	**0.314** **(0.013)*** **	0.362 (0.020)***	**0.277** **(0.017)*** **	**0.337** **(0.022)*** **	**0.304** **(0.017)*** **	0.2350
Observations	14,997	5,812	9,185	6,382	8,615	

Notes: GHQ Caseness Score ranges from 0 to 12, and higher values represent higher levels of mental distress. Control variables: ethnic background, mental health at previous wave, age, age square, gender, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Standard errors are clustered at individual level. * p<0.1; ** p<0.05; *** p<0.01

Appendix

Table A1. Factor Analysis for Financial Insecurity – Rotated Factor Loadings and Unique Variances (Method: Principal Component Factor)

Variable	Factor 1	Uniqueness
Do you expect your financial situation to be worse in the future?	0.5227	0.7268
Have you asked your bank for a mortgage holiday? (%)	0.5036	0.7464
Have you given or received financial help to or from family or friends not living with you? (%)	0.5406	0.7077
Have you applied for Universal Credit? (%)	0.5608	0.6855
Did you borrow from a bank or use a credit card to deal with lower earnings from January/February 2020? (%)	0.5525	0.6947

Table A2. COVID-19 and Mental Health (Employed or Self-Employed)

	Mental Health GHQ-12 Likert Score				
	All sample	**Wave 9 Income < median**	**Wave 9 Income > median**	**Fathers**	**Mothers**
Index of financial insecurity	**0.756 (0.058)*** **	**0.831 (0.082)*** **	**0.666 (0.083)*** **	**0.965 (0.092)*** **	**0.637 (0.074)*** **
Children < 4 y.o.	0.120 (0.212)	-0.259 (0.341)	0.393 (0.273)	-0.346 (0.273)	0.516 (0.316)
Children 5-15 y.o.	-0.209 (0.173)	0.160 (0.312)	-0.343 (0.209)	-0.132 (0.231)	-0.289 (0.256)
1-7 hours	0.216 (0.218)	-0.278 (0.389)	**0.449 (0.263)***	0.296 (0.285)	0.158 (0.330)
8-19 hours	0.289 (0.229)	-0.004 (0.401)	0.417 (0.281)	**0.533 (0.310)***	0.198 (0.332)
20 or more hours	**0.672 (0.227)*** **	0.472 (0.405)	**0.717 (0.273)*** **	0.384 (0.319)	**0.840 (0.321)*** **
Observations	14,997	5,812	9,185	6,382	8,615

Notes: GHQ Likert score ranges from 0 to 36 and higher values represent worse mental health. Control variables: ethnic background, age, age square, mental health at previous wave, gender, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Standard errors are clustered at individual level. * p<0.1; ** p<0.05; *** p<0.01

Table A3. COVID-19 and Mental Health (Employed or Self-Employed, Individual GHQ Components)

	Feeling constantly under strain	Losing sleep over worrying	Unable to make decisions	Losing confidence	Feeling worthless	Unable to concentrate	Unable to face problems	Unable to enjoy day to day activities	Unable to overcome difficulties	Unable to play a useful role	Feeling depressed	Feeling unhappy
Index of financial insecurity	0.048 (0.004)***	0.049 (0.004)***	0.026 (0.004)***	0.031 (0.004)***	0.023 (0.003)***	0.034 (0.004)***	0.029 (0.004)***	0.018 (0.004)***	0.040 (0.004)***	0.039 (0.004)***	0.041 (0.004)***	0.035 (0.004)***
Children < 4 y.o.	0.043 (0.017)**	-0.008 (0.016)	0.005 (0.012)	0.012 (0.014)	0.016 (0.011)	-0.016 (0.016)	-0.004 (0.012)	0.001 (0.018)	0.007 (0.013)	-0.048 (0.015)***	0.004 (0.016)	0.005 (0.015)
Children 5-15 y.o.	0.016 (0.014)	-0.016 (0.013)	-0.020 (0.010)**	0.003 (0.012)	0.021 (0.009)**	-0.027 (0.013)**	-0.001 (0.010)	-0.016 (0.015)	-0.005 (0.011)	-0.034 (0.012)***	-0.020 (0.013)	-0.007 (0.012)
1-7 hours	0.021 (0.019)	0.014 (0.017)	0.011 (0.013)	0.006 (0.015)	-0.023 (0.011)**	0.033 (0.017)*	0.005 (0.012)	0.021 (0.019)	0.012 (0.014)	0.018 (0.016)	0.006 (0.017)	0.008 (0.015)
8-19 hours	0.020 (0.019)	0.031 (0.017)*	0.024 (0.013)*	0.025 (0.015)	0.003 (0.012)	0.042 (0.018)**	0.006 (0.013)	-0.001 (0.020)	0.015 (0.014)	0.021 (0.016)	0.027 (0.018)	0.011 (0.016)
20 or more hours	0.093 (0.019)***	0.061 (0.017)***	0.038 (0.013)***	0.033 (0.015)**	-0.007 (0.011)	0.082 (0.017)***	0.013 (0.013)	0.028 (0.019)	0.032 (0.014)**	0.070 (0.016)***	0.047 (0.017)***	0.032 (0.016)**
Observations	15,053	15,065	15,058	15,034	15,034	15,067	15,040	15,046	15,051	15,053	15,053	15,034

Notes: Control variables: ethnic background, age, age square, gender, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Standard errors are clustered at individual level. * p<0.1; ** p<0.05; *** p<0.01

Table A4 – COVID-19 and Financial Insecurity (Working and Non-Working Individuals)

	Expect subjective financial situation to be worse in the future	**Having a mortgage holiday**	**Having a credit holiday (second COVID-19 wave only)**	**Has received financial transfers**	**Has applied for Universal Credit**	**Is borrowing from a bank or credit card to compensate for loss in earnings**	**How likely it is that you will have difficulties in paying your bills (in %)? (second COVID-19 wave only)**
Working parent	**-0.096**	-0.022	-0.008	0.016	**-0.091**	-0.008	1.466
	(0.026)* **	(0.022)	(0.026)	(0.020)	**(0.023)*** **	(0.015)	(2.406)
Non-working parent	0.021	**0.015**	0.014	**0.044**	0.007	**0.014**	**7.741**
	(0.013)	**(0.008)***	(0.010)	**(0.012)*** **	(0.009)	**(0.006)** **	**(1.381)*** **
Parent working at wave 9	**0.123**	**0.067**	0.034	-0.001	**0.104**	0.020	1.541
	(0.026)* **	**(0.022)*** **	(0.025)	(0.020)	**(0.023)*** **	(0.015)	(2.383)
Observations	26,450	26,544	12,186	26,501	26,204	26,439	11,955

Notes: Control variables: ethnic background, age, age square, gender, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Standard errors are clustered at individual level. * *p*<0.1; ** *p*<0.05; *** *p*<0.01

Table A5 – COVID-19 and Mental Health (Working and Non-Working Individuals)

Mental Health GHQ-12 Caseness Score	**All sample**
Index of financial insecurity	**0.459**
	(0.028)***
Children < 4 y.o.	-0.094
	(0.109)
Children 5-15 y.o.	-0.103
	(0.088)
1-7 hours	0.069
	(0.114)
8-19 hours	**0.204**
	(0.121)*
20 or more hours	**0.538**
	(.116)***
Observations	24,898

Notes: Control variables: ethnic background, age, age square, gender, mental health at previous wave, employment status, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). Standard errors are clustered at individual level. * p<0.1; ** p<0.05; *** p<0.01

Table A6 –Difference-in-Differences Model (Working and Non-Working Individuals)

	Mental health	**Expect subjective financial situation to be worse in the future**
Working parent (before COVID-19)	**-0.303** **(0.065)*** **	**-0.041** **(0.007)*** **
Post-COVID19 wave	**1.003** **(0.031)*** **	**-0.018** **(0.003)*** **
Interaction between working parent and post-COVID19 wave	**0.217** **(0.061)*** **	**0.082** **(0.007)*** **
Observations	54,179	54,864

Notes: Control variables: ethnic background, age, age square, gender, mental health at previous wave (in the mental health equation only) employment status, education, children by age group, couple, household gross income at wave 9, GOR (Government Office Region). Standard errors are clustered at individual level. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table A7. COVID-19 and Financial Insecurity (Employed or Self-Employed, Clustering at Household or GOR Levels)

Post-COVID-19 waves	(1) Expect subjective financial situation to be worse in the future	(2) Having a mortgage holiday	(3) Having a credit holiday§	(4) Has received financial transfers	(5) Has applied for Universal Credit	(6) Is borrowing from a bank or credit card to compensate for loss in earnings	(7) How likely it is that you will have difficulties in paying your bills (in %)?§
Working parents (SE clustered at household level)	**0.027** **(0.008)*****	**0.036** **(0.007)*****	**0.021** **(0.006)*****	**0.017** **(0.004)*****	**0.010** **(0.005)****	**0.011** **(0.003)*****	**2.956** **(0.607)*****
Working parents (SE clustered at GOR level)	**0.027** **(0.007)*****	**0.036** **(0.010)*****	**0.021** **(0.006)*****	**0.016** **(0.004)*****	**0.010** **(0.004)****	**0.010** **(0.003)*****	**2.965** **(0.395)*****

Notes: Control variables: ethnic background, age, age square, gender, employment status, education, children by age group, couple, household gross income at wave 9, GOR (Government Office Region). * *p*<0.1; ** *p*<0.05; *** *p*<0.01

Table A8. COVID-19 and Mental Health (Employed or Self-Employed, Clustering at Household or GOR Levels)

	(1) All sample- SE Clustered at household level	(1) All sample- SE Clustered at GOR level
A: Index of financial insecurity	0.411 (0.034)***	0.411 (0.030)***
B: Children < 4 y.o.	0.020 (0.122)	0.020 (0.083)
C: Children 5-15 y.o.	-0.106 (0.098)	-0.106 (0.048)**
D: 1-7 hours	0.131 (0.121)	0.131 (0.136)
E: 8-19 hours	0.216 (0.131)*	0.216 (0.082)**
F: 20 or more hours	0.525 (0.127)***	0.525 (0.067)***
Observations	14,997	14,997

Notes: Control variables: ethnic background, age, age square, gender, employment status, mental health at previous wave, education, employment status at previous wave, couple, household gross income at wave 9, GOR (Government Office Region). * *p*<0.1; ** *p*<0.05; *** *p*<0.01

Response to Reviewer 1

This paper analyses the impact of the initial covid-19 lockdown on perceived financial insecurity and mental health in the UK. It pays particular attention to the costs for working parents and heterogeneity by gender and pre-COVID income. The paper clearly addresses a crucial topic, is very well written and I enjoyed reading it. I would like to congratulate the authors. I think the paper warrants publication in REHO.

We thank the reviewer for these comments. We are very pleased to know that you enjoyed reading our manuscript.

1) *My biggest query is why you focus only on previously working individuals. After parenthood, many more fathers continue to work than mothers. This means that your sample of fathers will be more selected than your sample of mothers. Clearly, you're not going to be able to *solve* this selection problem here, however, I think it would be nice to also include the non-working parents and then include an indicator for them and for the interaction of parent and working before. At least as a robustness check.*

We take your point regarding the issue of selection, and agree that it would be a tall order to solve that problem given the dataset. Upon your suggestion, though, we now include (in the appendix as Table A4) regressions which include non-working parents in the sample, as well as an interaction term for parental status and employment status in the previous wave. In these regressions, not working during the pandemic would be associated with severe outcomes with respect to financial insecurity.

We do emphasise at the outset, however, that the focus of the paper is a comparison between working parents and working non-parents. This focus flows from the idea – supported by the literature – that the competing demands over a parent's time resource can lead to the deterioration of a parent's mental health over and above the pandemic-induced distress. In the beginning of the paper, we highlight the absorption of childcare and schooling into the home environment, for instance, as a potential predictor for both financial insecurity and mental distress.

Similarly, we have estimated the impact of financial insecurity and time spent with children on mental health for working and non-working individuals (Table A5 in the appendix). The substantive conclusions remain the same: financial insecurity and spending long hours with children during the pandemic predict worse mental health outcomes.

Overall, we believe that the main focus of the paper continues to be on the increased difficulties experienced by working parents because of conflicting demands of work and family life at the time of the pandemic. Thus, we continue to focus on employed individuals (at COVID-19 waves) in our main model while controlling for previous employment status.

2) *Table 7: I can see the relationship between financial insecurity, childcare and mental health is different for men and women. But it would be nice to have an overall test of the effect of covid for mothers vs. fathers. I know others have already done this, but it would be nice for your sample for consistency. Would also be interesting to see the coefs on the control for previous mental health.*

We have now included the coefficients of previous mental health (last row) and results from an overall test of different effects between men and women (last column) in Table 7.

3) The formatting of the tables could do with some attention.

Absolutely. We have paid more attention to the formatting of the table. Thank you for your patience on this.

4) I would suggest you add references in the introduction to two further papers on covid and mental health (the latter you have later but now upfront):

https://drive.google.com/file/d/1xSINm_R1QfrrPGaQYGCXho-_qcR64iom/view,

. There are probably more too. Given this literature is evolving so quickly, I think it would be useful for your readers to see these findings validated from multiple studies.

We have included these references you suggested in the introduction. We have also included an additional paper that is directly relevant (Johnston, Kung, and Shields, 2020).

Response to Reviewer 2

Using data from the UK Household Longitudinal Study, the authors investigate the impact of COVID-19 pandemic on financial security and mental health of working parents relative to working individuals without children. They find that financial stress during the pandemic is higher for working parents compared to working individuals without children, while mental health is lower. Effects on mental health seem to be driven by both increased financial insecurity and time spent on childcare. In addition, they find that the negative effects are disproportionately borne by parents with small children, mothers, and poorer household. Overall, I enjoyed reading the paper. It studies an important and timely topic using rich, high-quality data. The writing is clear. The questions asked and answered about the financial situation and mental health of working parents are concise and interesting.

We thank the reviewer for these comments. We are very pleased to know that you enjoyed reading our manuscript.

My main concerns are methodological. It is not clear to me why the authors do not estimate a DiD regression, in which they include both the difference between parents vs. non-parents and in time, i.e., before and after the pandemic. It seems that the authors estimate separate regressions for the waves before and after the pandemic and then eyeball-compare the differences in coefficients across the different estimations without proper tests.

We have not estimated a difference-in-differences model since most of the outcomes we consider are not observed in the waves before the beginning of the COVID-19 pandemic in the dataset. The pre-pandemic waves also did not include any information on hours spent in childcare or home schooling.

At least for the outcome where pre- and post-COVID-19 information is available, we did estimate a DID model upon your suggestion. This is presented in Table A6 in the appendix. The results are consistent with the main results: working parents had better mental health and financial expectations before the pandemic started, but their situation dramatically worsened in the post-COVID19 waves. They also became more likely to experience increased financial stress and worse mental health.

Conceptually, I think the authors could improve the paper by linking the financial stress part more to the mental well-being. Why are we looking at these two dimensions in one paper? How are they linked? Is the goal here to examine the effect of financial insecurity on mental health? This could be made clearer, but is mostly a matter of improving the framing of the paper.

We agree. In light of your suggestions, we have substantially rewritten the introduction and provided further references that are directly related to our principal research question. In particular, we have emphasised that our focus is on, first, the financial insecurity experienced by working parents as a result of the pandemic lockdown (and associated adjustments); second, the subsequent relationship between this distress and mental health while controlling for the time spent on childcare and home schooling. We hope we have clarified further our intent in the rewritten introduction.

a) *The tables are difficult to read. What is shown here? Estimated coefficients, combination of coefficients? In tables 4-5 it seems that each line (A-H) shows a coefficient from a different regression but different definition of working parent, but it is not entirely clear.*

What's more, in tables 6-7 it seems that each line shows the coefficient on a different variable, but from the same regression. This is very confusing. Moreover, the tables lack standard information like sample size, etc.

Absolutely. We have paid more attention to the formatting of the table. Thank you for your patience on this. We now provide the observation numbers, but we suppress other model information such as the R^2 and F statistic for brevity. We feel that the test results on the parameter of interest is sufficient information. We have expanded the table notes for a clearer explanation. We also included an explanatory text: “Each coefficient estimate is from a separate regression with different types of working parents as the explanatory variable of interest.”

b) *I don't think it makes sense to cluster standard errors at the individual level given that, from what I understood, each individual appears only once in the data set. Standard error should be clustered at the level at which the main explanatory variable of interest varies. Since the impact of Covid may very at the local level, it could make sense to cluster at the Government Office Region. However, given that it is not obvious at what level observations would cluster, and given that the authors test many hypotheses, it seems more important to adjust p-values for multiple hypothesis testing than to cluster standard errors at an arbitrary level.*

We have clustered standard errors at individual level because individuals are observed twice in the post-COVID-19 waves. Our concern here is the correlated error within the same individual, so we decided on this level of clustering. That said, we also clustered at two other levels in separate regressions (at the household and the GOR levels; see Tables A7 and A8). The substantive conclusions do not change.

c) *The effects on mental well-being could be more easily interpreted if also the dependent variable was standardised. In the current presentation, it is difficult to imagine what it means that "one-standard-deviation increase in the index of financial insecurity is associated with an increase in the Caseness score of 0.411".*

With respect, we believe that it is easier to understand the estimated coefficients the way we have presented it (which is consistent to the literature in the field, see for example Johnston et al., 2020, among others). Perhaps it might help the reader to be reminded that the Caseness score ranges from 0 to 12, and that the mean values for different subgroups of this Caseness score (including the standard deviation) are presented in Table 2. We have now done so on p. 11 to ease with the interpretation.

d) *Check for typos, e.g. second sentence in section 4 should be "The results correspond … in Sec. 3"; last sentence in the third to last paragraph of section 5 should be "…, which do not have adequate facilities…".*

We have now carefully proofread the manuscript and corrected all typos in the text that we could find.