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The mental health effects of the first two months of lockdown and social distancing during the Covid-19 pandemic in the UK

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Abstract

Mental health in the UK worsened substantially as a result of the Covid-19 pandemic – by 8.1% on average and by much more for young adults and for women which are groups that already had lower levels of mental health before Covid-19. Hence inequalities in mental health have been increased by the pandemic. Even larger average effects are observed for measures of mental health that capture the number problems reported or the fraction of the population reporting any frequent or severe problems, which more than doubled for some groups such as young women. It is important to control for pre-existing recent trends in mental health when attempting to understand and isolate the effects of Covid-19.

Acknowledgements

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Introduction

From the outset it has been clear that the potential mental health effect of the Covid-19 pandemic, and the lockdown and social distancing that was imposed in response to it, was going to be one of the most important aspects of the crisis. Mental health and subjective wellbeing outcomes are important in their own right, and they are also risk factors for future physical health and longevity (see Kivimäki et al 2017) so will be an indication of the future indirect health consequences of the pandemic. In addition, mental health and wellbeing will influence and drive a number of other individual choices, behaviours and hence outcomes.

Early indicators from cross-sectional studies or bespoke online Covid-specific surveys have already shown lower levels of subjective wellbeing and higher anxiety in the UK population than those observed in the last quarter of 2019 (ONS, 2020) and that these reduced levels are being sustained through the weeks of the lockdown and social distancing albeit with some small and gradual improvement in recent weeks (Fancourt et al. 2020). The impacts of Covid-19 on mental health has been identified as an important area of research going forward (Holmes et al. 2020), and a number of papers have pointed out that mental health considerations should be an important element of decisions regarding at what speed and in what way to lift the lockdown and social distancing restrictions that have been imposed (e.g. Layard et al. 2020).

In this study we move beyond either cross-sectional or within-pandemic analyses. We document and analyse the individual level effects of the pandemic on mental health using longitudinal data from the Understanding Society study (University of Essex, 2020a, 2020b) in order to look at the distribution of individual's mental health outcomes in the context of their pre-pandemic trajectories.[1] Since the latest publicly available pre-pandemic data for the

[1] Understanding Society has been collecting information annually on a sample of almost 100,000 individuals since 2010 (see University of Essex (2019) for details) and introduced a monthly internet component in May 2020 for a subset of almost 20,000 respondents to cover the duration of the pandemic (see University of Essex (2020)). The COVID-19 data used here are those for the first COVID wave, collected in April 2020.

Understanding Society sample is already somewhat dated[2] and since there are important pre-existing trends in mental health by age, year and month of interview, it is important that we do not attribute all changes between waves to the pandemic itself. Thus, in our analysis we create a simple individual-specific counterfactual prediction of the likely level of mental health in April 2020 in the absence of the pandemic, based on the trajectories previously observed for that respondent and changes in (observed) personal circumstances between the latest pre-pandemic wave and February 2020. We then then compare the actual April 2020 observations to that prediction. We also discuss how this changes the results in comparison to looking at the raw differences between the most recent Understanding Society wave and the April 2020 observation.

The main outcome measure we use in this analysis is the GHQ-12 measure of mental health, distress and wellbeing (see Cox et al, 1987) which is a commonly used indicator although somewhat more broad and non-specific than would be ideal if one wanted to study specific mechanisms underlying changes in individual mental health conditions such as depression, anxiety or stress. The main advantage of the GHQ-12, however, is that since it is a relatively brief 12-item scale it has been collected in all waves of Understanding Society to date and was also included in the COVID-19 module.[3]

In keeping with the other 'real-time' evidence on mental health that has already emerged, the Understanding Society Covid-19 data indicate a sizeable deterioration in mental health, and this is true regardless of whether or not (and if so how) we control for recent per-crisis trends. The average GHQ-12 score (indicating poor mental health) rose by 10.8% between wave 9 and the Covid module, and the 'effect' of the crisis was a deterioration of

[2] The most recent pre-Covid observation currently publicly available on Understanding Society respondents relates to some time between May 2017 and May 2019, depending on when the respondent was interviewed, with only very few cases being collected after January 2019.

[3] In addition, with the exception of wave 1 of Understanding Society when it was collected as part of the face to face interview, it has always been collected as part of a self-administered module so we might expect minimal mode effects in measurement as a result of the COVID-19 questionnaire being administered online.

8.1% when taking into account pre-crisis trends. This average deterioration (of one point on the 36-point GHQ scale) is large, being of a magnitude roughly equivalent to the mean difference in GHQ scores between the top decile and the bottom decile of the income distribution in 2017/8, nearly double the rise in average GHQ scores in total over the last four waves of the pre-pandemic data. We also show that this overall deterioration was driven by more reported problems, and a higher fraction of problems being reported 'much more than usual' (which we refer to as 'severe' for the purposes of this paper), as opposed to just mild deteriorations in existing problems for all. The number of problems reported rose by one – an increase of 50% – and the fraction of the sample reporting at least one severe problem doubled from 10.2% to 23.7%. Our individual level analysis shows that these average effects arose from much greater than average changes for women and for young adults, with some groups (particularly older men) being relatively unaffected.

The size of these age and gender effects depend on how we control for pre-crisis trends but they are relatively unaffected when we add more idiosyncratic factors to our model in order to control for the individual-level exposure to the effects of the pandemic. Other things equal, key workers had less of a deterioration, and those who were laid off, had young children, or who had Covid symptoms on the day of the interview had a greater deterioration. There was no evidence of statistically significant differential effects of other factors such as the respondent's pre-existing health vulnerabilities, employment or furlough status, marital status, ethnicity or region of residence. This is despite the fact that, with a sample size of nearly 12,000 observations we would have a good degree of statistical power to pick up potential effects.

Our results also show clearly that the Covid pandemic has widened mental health inequalities, with the groups that had the poorest mental health pre-crisis also having had the largest deterioration. Qualitatively, this conclusion is obtained regardless of whether one uses

past data in its raw form or attempts to control for pre-crisis trends, and indeed this is also unsurprising given what is already known about the deterioration in mental health for specific groups from the pre-existing cross-sectional analysis. In our framework though, we are able to quantify the increase in prevalence, and the increase in between-group inequalities, taking into account individual heterogeneity and with some control for the trends that would have happened anyway.

In addition to showing that some groups were more affected than others, and that the magnitude of these (relative) effects depends on how one controls for pre-crisis trends, we also provide some concluding analysis of the individual elements of the GHQ-12 questionnaire to show that some dimensions of mental health were affected more than others, and by more for some groups than others. We show that whilst measures relating to general happiness deteriorated for all age groups, trends in other dimensions are particularly negative and/or specific to young adults.

Data and methodology

We use panel data from the UK Household Longitudinal Study (UKHLS), also known as Understanding Society. The study began in 2009 and included 36,000 individuals in the latest wave (wave 9). Interview waves span three overlapping years, with the vast majority of interviews taking place in the first two years, so that wave 1 runs from 2009 to 2011, wave 2 from 2010 to 2013 and so on. Adults aged 16 or older in each household are re-interviewed approximately one year apart, including individuals who move addresses or leave their original households to form new households. The sample is weighted to be nationally representative.

In April 2020, participants of the UKHLS were asked to complete a short online survey on the impact of the Covid-19 pandemic and this survey included the GHQ-12

instrument as well as information on demographics economic conditions in February 2020 (just before the start of the pandemic) and in April 2020. Full details of sample design, response rates and response patterns are given in Institute for Social and Economic Research (2020). There were 17,452 full responses to the survey, and response rates for individuals previously interviewed at wave 9 were 46.0%.[4] After dropping cases without wave 9 information which we need for our pre-crisis analysis and other cases with zero weight (N=4,506) and dropping cases with missing responses to the GHQ-12 scale (N=966), we are left with a resulting analysis sample of 11,980 individuals. We use this data to study the impact of Covid-19 on mental health, and how it relates to demographic characteristics and other factors like the health and economic impact of the pandemic. We consider three measures of mental health based on the GHQ-12: the overall GHQ score (the Likert scale), the number of components with a score of 3 or above (the Caseness scale) and a binary indicator of whether any of the components has a score of 4. The last two measures can be interpreted as the number of problems reported, and whether any frequent/severe problems are reported, respectively. See Appendix B for further details on the GHQ-12.

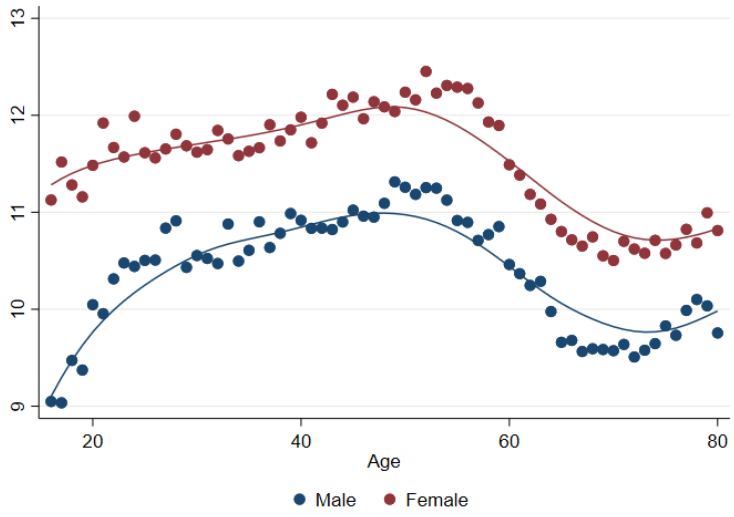
Estimating the impact of Covid-19 requires an estimate of counterfactual mental health in the absence of Covid-19. Identification of a full and robust individual-specific counterfactual will be a challenge even in the longer run when more extensive data become available. Nevertheless, we should still attempt to create the best pre-crisis measure possible since if one is to investigate the effects of the pandemic by looking at individual-level changes before and during (or after) the crisis then this implicitly attributes all observed changes to the crisis, which will be differentially problematic for different groups.

[4] In all our analysis we use the Covid-19 module cross-sectional weights to adjust for unequal selection probabilities and differential non-response since even though our predictions are formed from longitudinal data our key analysis is of the Covid module cross-sectional data. These weights model response probabilities conditional on past response to wave 9 and assign zero weight to individuals that had not responded to wave 9, hence we are implicitly providing estimates that are representative of the UK household population in 2017/18.

The latest data on each respondent's mental health is from wave 9, which was carried out between January 2017 to May 2019, with 96% of interviews taking place between 2017 and 2018. There are a number of reasons we would expect individuals' mental health at the onset of Covid-19 to differ from their wave 9 values. First, wellbeing is U-shaped over the lifecycle, with mental health problems peaking in middle age and particularly steep differences changes in mental health within young adults and those approaching and moving into retirement. This is shown in Figure 1 which pools data across all waves of the UKHLS. Second, there are pre-existing trends in mental health that vary by age and gender. Figure 2 shows that between wave 6 (January 2014-May 2016) and wave 9 (January 2017-May 2019), mental health problems as measured by the overall GHQ score and the number of problems increased across most age groups, especially among the young. Meanwhile, the share of individuals with any severe problems declined over recent years, with older individuals seeing a steeper decline. Third, there are seasonal trends in mental health. GHQ scores fall (mental health improves) in the spring and summer months, as shown in Figure 3, which means that a sample interviewed entirely in April will not be comparable to a sample interviewed across a previous year.

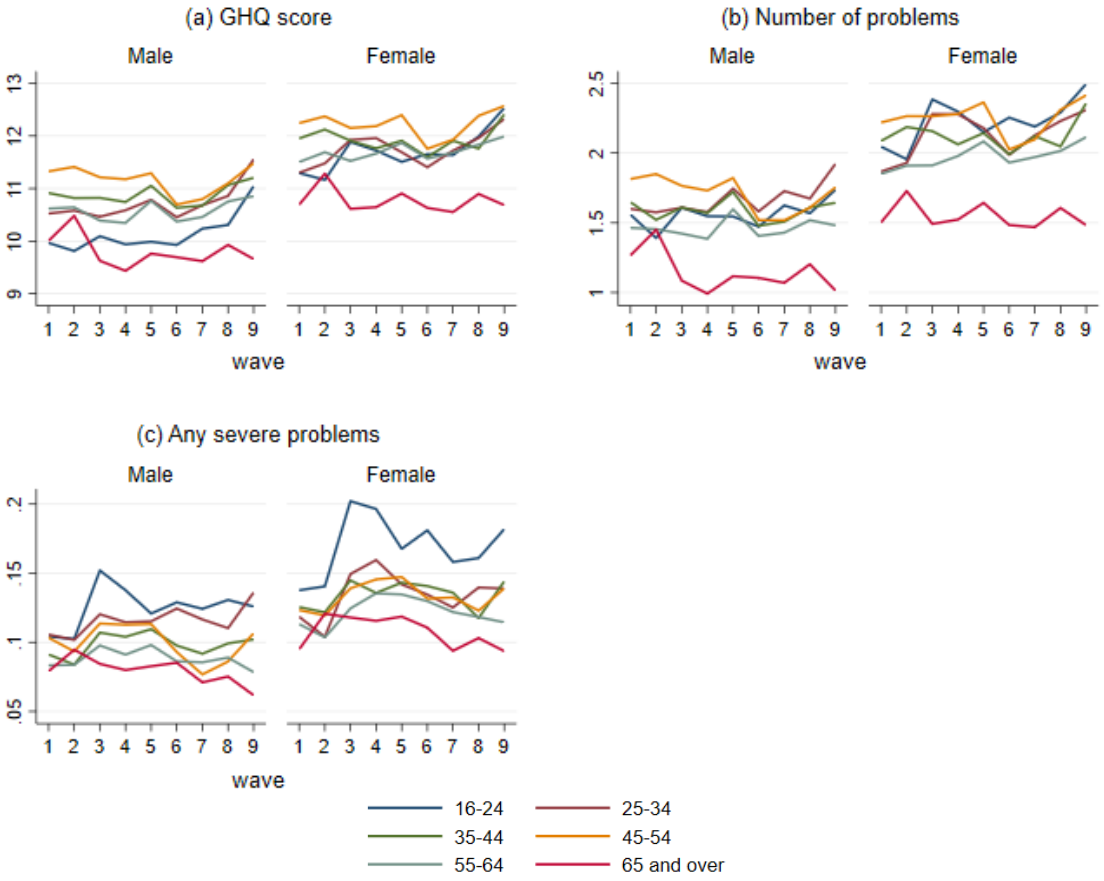
Finally, individuals may have had idiosyncratic changes in circumstances over the two to three years that elapsed between their wave 9 interview and the month immediately preceding the Covid-19 pandemic that may have affected their pre-crisis wellbeing levels. Some of these changes will be captured in the Covid-19 module which asks a limited number of questions referring to the respondent's situation in February 2020, for example on employment status, and so it is possible to include controls for these in our analysis.

Figure 1. Age profile in GHQ scores, waves 1-9 (January 2009 to May 2019)



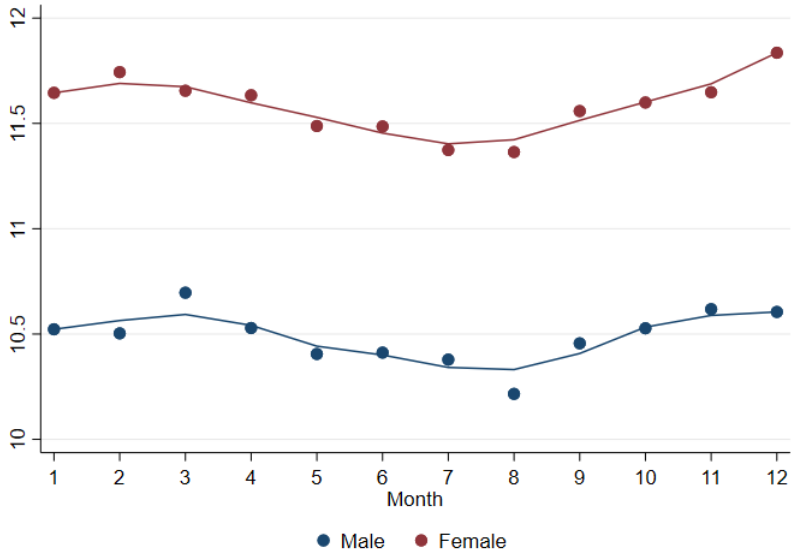
Source: UKHLS Waves 1-9 and April Covid-19 survey
Notes: Excludes individuals over the age of 80.

Figure 2. Trends in mental health by age and gender, waves 1-9 (January 2009 to May 2019)



Source: UKHLS waves 1-9 and April Covid-19 survey
Note: The waves ran as follows: wave 1 January 2009-March 2011, wave 2 January 2010-March 2012, wave 3 January 2011-July 2013, wave 4 January 2012-June 2013, wave 5 January 2013-June 2015, wave 6 January 2014-May 2016, wave 7 January 2015-May 2017, wave 8 January 2016-May 2018, wave 9 January 2017-May 2019.

Figure 3. Seasonal trends in GHQ scores, waves 1-9 (January 2009 to May 2019)



Source: UKHLS Waves 1-9 and April Covid-19 survey

In the analysis that follows we therefore define the 'effect' of the pandemic as the difference between and individuals April 2020 mental health and a prediction of the likely level of mental health in April 2020 in the absence of the pandemic. We compare this to a measure of the effect that is just the simple difference between the respondent's April 2020 and wave 9 values. We use three sets of prediction models, each estimated using waves 6-9 (covering the period 2015-2019) and including individual fixed effects. The models are estimated separately for six subsamples defined by gender and the individual's broad age group in wave 9 (split into 16-34, 35-64 and 65 and over) to allow time trends to vary by gender and age group, as we see in Figure 2 above. The models are nested and defined as follows: Model (a) simply controls for quadratic age and month effects, Model (b) adds an additional linear year effect, and model (c) includes additional controls for work status in February 2020 (i.e. just before the pandemic), living in a couple, the number of children in the household in three age groups (0-4, 5-15 and 16-18) and the region of residence. Each model is then used to predict the respondent's mental health in April 2020 and this will be an individual specific prediction due to the inclusion of the individual fixed effect.

The prediction models for each of our mental health measures (GHQ score, the number of problems and the share with any severe problems) are given in Tables A.1 to A.3 in the Appendix. Figures A.1 to A.3 show wave 9 values alongside the three predicted counterfactual values from the models described above. We see that predicted counterfactual GHQ scores and the number of problems are higher than their wave 9 values across most gender and age groups, and particularly for younger individuals, which reflects the upward trend in mental health problems over recent years. This means that a naïve comparison of April 2020 to wave 9 GHQ scores would overstate the impact of the pandemic, particularly for young people for whom the pre-trend has been steepest. On the other hand, a naïve comparison would understate the impact on severe mental health problems for some gender and age groups, which have been on a downward trend.

Results

Changes in overall GHQ

Figure 4 shows the distribution of mental health for the April 2020 sample across our three measures by gender and age group. Group-level averages are given for wave 9, our counterfactual prediction ('April 2020 predicted') and in April 2020 ('Covid'). The predictions are based on Model (c) which includes the full set of covariates, though as shown in Figures A.1 to A.3 group-level averages are very similar across the three prediction models. The blue dots show age group averages for men and the red dots for women. Average GHQ scores across all individuals are marked by the grey squares.

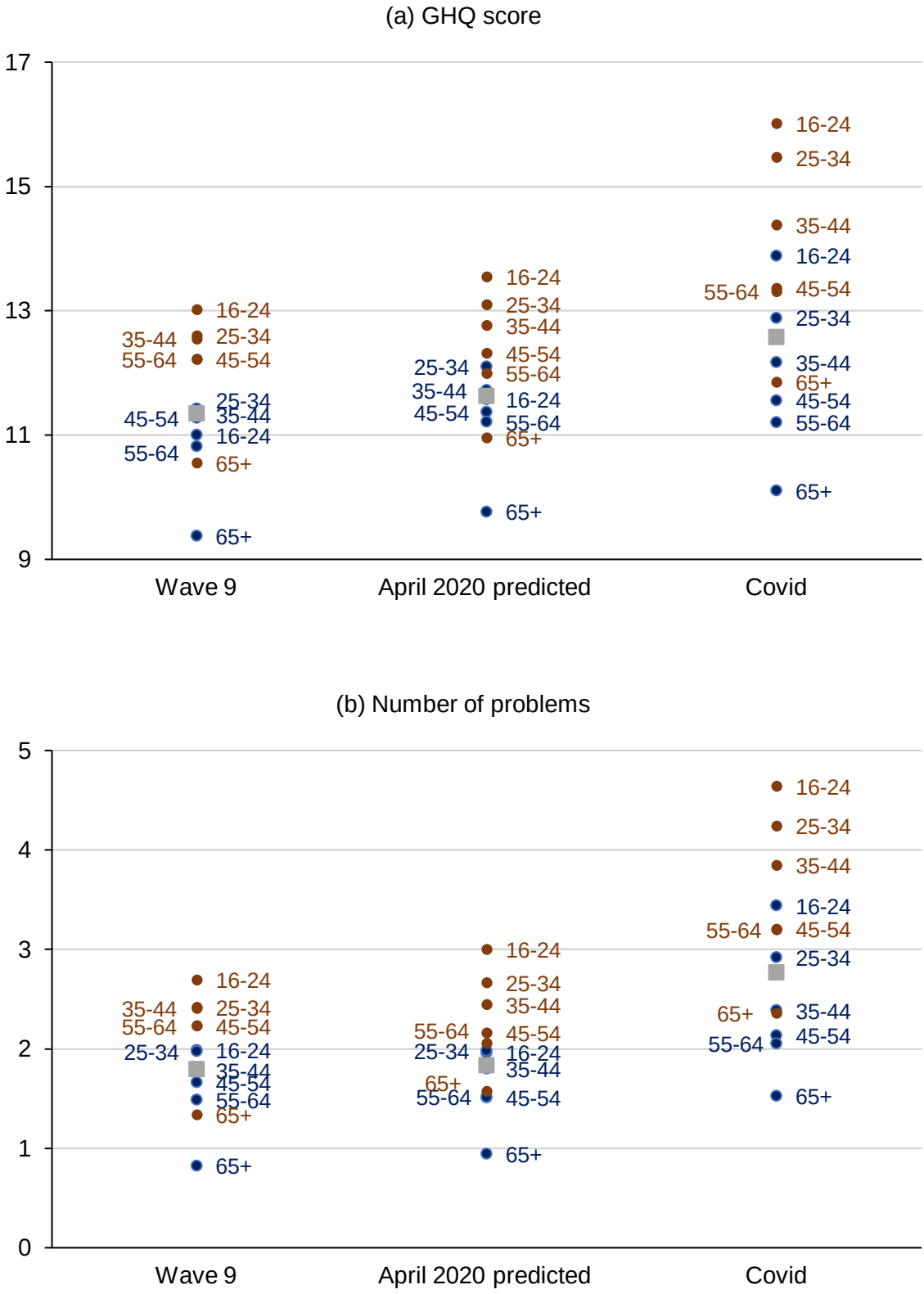
Mental health levels have deteriorated during the Covid-19 pandemic, relative to both Wave 9 levels and our counterfactual prediction. Average GHQ scores across all individuals in April 2020 were 1.23 points (10.8 %) higher than in Wave 9 and 0.94 points (8.1%) higher than our counterfactual prediction. It is helpful to have a sense of the distribution of mental

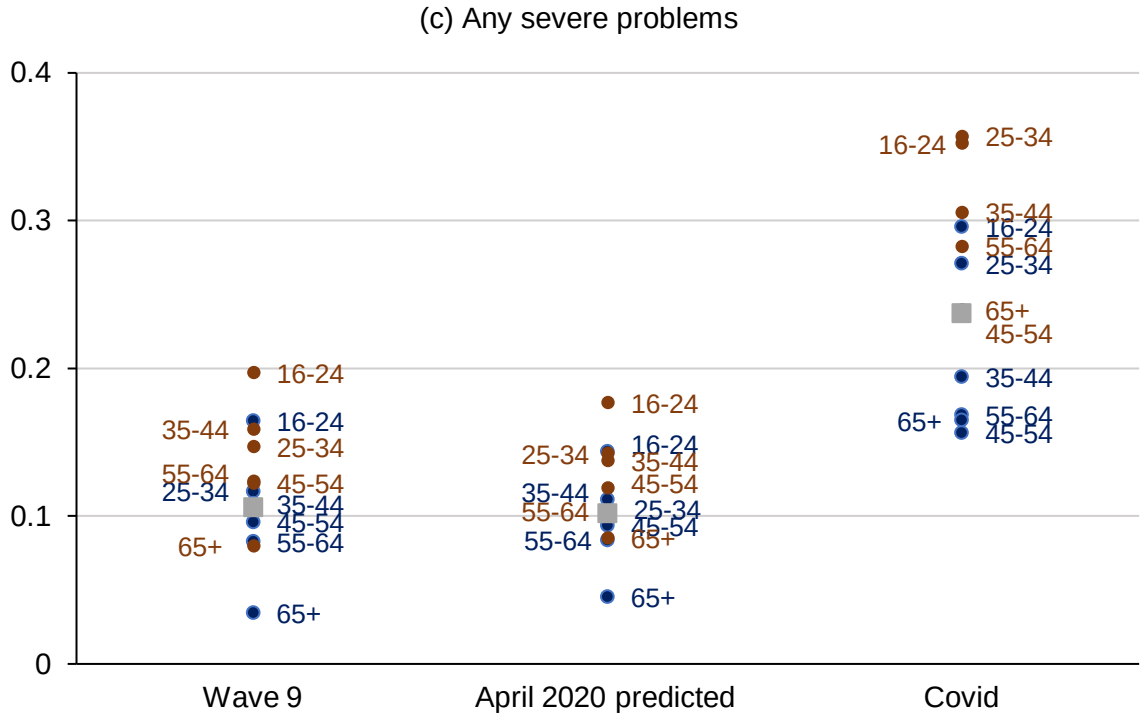
health scores before the pandemic to interpret the magnitude of these changes. The distribution and subgroup means of the three mental health measures are given in Table A.4. For context, one point on the GHQ (Likert) scale is roughly equivalent to the average difference between men and women at wave 9, and to the average difference between those in the top quintile of the household income distribution and those in the bottom quintile. The previous four waves of data combined, collected over the period 2015-2019 during which there was concern about the rising prevalence of mental health problems, showed a rise of GHQ average scores of just over half a point (0.54).

The deterioration in mental health was more marked for our indicators of the number of problems or the fraction of people with any severe problems. Individuals reported an average of one more problem, which is roughly twice the average difference between men and women at wave 9, and twice the difference between the top and bottom income quintiles. The share reporting any severe problems more than doubled, from 10.6% in wave 9 and 10.2% in our counterfactual prediction to 23.7% in April 2020.

Covid-19 appears to have widened inequalities in mental health across gender and age groups and exacerbated pre-existing inequalities. Across all three measures, groups that had poor mental health before the pandemic hit generally suffered the largest deterioration in mental health, both in absolute and percentage terms. Young women saw the largest deterioration in mental health as result of Covid-19: average GHQ scores among women aged 16-24 rose by 2.5 points or 18.2% relative to the counterfactual prediction, and the share reporting a severe problem doubled from 17.6% to 35.2%. On the other hand, men aged 65 and over saw relatively little change in their GHQ scores and the number of problems reported, though the share reporting any severe problems increased sharply in percentage terms.

Figure 4. GHQ-12 before and during Covid-19 by gender and age group





Source: UKHLS Waves 6-9 and April Covid-19 survey
Note: Wave 9 refers to January 2017-May 2019. Predicted values based on prediction using full set of controls (model c), with time effects set to April 2020. Values for male age groups indicated in Blue, values for female age groups in red. Grey squares are unconditional averages.

We now turn to examining how the impact of Covid-19 on mental health varies across individuals with different characteristics and different levels of exposure to the pandemic in terms of economic and health impacts. Table 1 and

Table ***2*** show regression results of the change in mental health measures (GHQ score, number of problems and the share with any severe problems), assessed relative to wave 9 and our counterfactual prediction, respectively. Recall that a one-point increase in GHQ scores is roughly equivalent to moving from the top to bottom quintile of the household income distribution at wave 9; an increase in one mental health problem is roughly double the distance between the richest and poorest groups.

In both Table 1 and

Table ***2***, the first column (a) shows the change in GHQ scores regressed on gender and age group alone (relative to men aged 45-54). As with the figures above, we see that the increase in GHQ scores is larger for women and young people. The coefficient on women is larger and the coefficients on younger age groups smaller using the counterfactual prediction than wave 9, which reflects differential pre-trends prior to Covid-19. Using the counterfactual prediction – our preferred specification – the coefficient on women is 0.98. The increase in GHQ scores is 1.7 points higher than among 16-24-year olds than among those aged 45-54, and 0.99 points higher among 25-34-year olds.

The second column (b) adds controls for other demographic variables (educational qualifications, ethnicity, region) and individual-level exposure to Covid-19 in terms household composition and caring responsibilities, whether they are medically vulnerable to Covid-19[5] or have suffered symptoms of Covid-19, and the extent to which they have been economically affected by the pandemic. We see that the size of the coefficients on gender and younger age groups are relatively unaffected by the inclusion of these controls, which indicates that they matter in their own right and are not simply proxying for other dimensions of exposure. However, the size of the coefficients on older age groups increases when controls are added, and we start to see more of a U-shaped profile in age, with larger mental health impacts on younger and older individuals relative to those in middle age. The positive coefficients on older cohorts disappear when our covariates capturing the economic impacts and the presence of children are dropped (the results of this additional regression are not presented here). So, whilst being older is associated with a larger deterioration in mental health all else equal, the smaller effects on older ages that are apparent in column (1.a) are a

[5] Based on whether they have ever having been diagnosed with a medical condition that places them at 'high risk' or 'very high risk' to the virus, and/or have been asked by the NHS to shield. See Covid-19 derived variables documentation for more details on medical conditions.

consequence of the fact that older people are more insulated from the economic and childcare shocks of the pandemic.

Women and younger people also experienced a larger increase in mental health problems controlling for other factors. Using our preferred specification (the counterfactual prediction model presented in

Table ***2***), women saw an increase of half a mental health problem more than men, all else equal, and the share of women with any severe problems increased by 6 percentage points more than men. Recalling Table A.4, this doubles the wave 9 gender gap in the number of problems, and more than doubles the percentage point difference in the shares of men and women with severe problems.

Medical vulnerabilities do not significantly affect the impact of Covid-19 on mental health using our preferred specification. But using a naïve comparison to wave 9, being at 'very high risk' of Covid-19 complications (based on pre-existing conditions) appears to *reduce* the impact of the virus on mental health. This is because this group consists of older people, who have had better mental health trends in recent years – which again illustrates the need to account for differential pre-trends in assessing the impact of Covid-19. Having symptoms of the virus at the time of the survey – predictably – has a very large and significant effect on all three measures. The coefficient on the overall GHQ score is 2.04 under our preferred specification, and the increase in the share with severe problems is 8 percentage points. Having had Covid-19 symptoms is also associated with more deterioration in mental health, but to a much smaller degree, and this is only statistically significant when looking at the number of mental health problems (not the other two measures).

Falls in household earnings since February 2020 are associated with a larger deterioration in mental health as result of Covid-19 that is statistically significant in some specifications and measures. Being laid off since February 2020 has a large impact on overall mental health problems (a 1.89 higher GHQ score and 1.16 more problems in our preferred specification), but does not appear to affect the measure of severe mental health problems. Conditional on changes in earnings, being furloughed appears to reduce the negative impact on mental health. Working in a sector that has been shut down during the lockdown – based on the classification in Joyce and Xu (2020) and wave 9 values since information on

industries is not available in the April 2020 survey – appears to have a negative effect over and above the direct effect on hours and earnings, perhaps reflecting increased precarity in these roles and uncertainty about future prospects. All else equal, the deterioration in mental health was smaller among key workers, and the effect is statistically significant using our preferred specification and the difference between this group and other workers will be explored in a little more detail in our final analysis.

Those with very young children aged 0-4 saw a significantly larger increase in overall mental health problems (but not severe problems), by around one GHQ point and half a mental health problem under our preferred specification. Those with school-aged children aged 5-15 also saw a larger increase in mental health problems that is statistically significant in some measures and specifications – the coefficient is between a third and half of that on very young children.

Coefficients are not shown in the tables due to a lack of statistical significance, but there is no evidence of differential effects by whether individuals are single or live alone or by educational qualifications. There are also no significant differences by ethnicity, with the exception of black individuals who saw a smaller deterioration in mental health all else equal. There is no evidence of differential effects across regions of the UK, despite differences in the spread of the virus in April.

Tables A.5 and A.6 report the results of our preferred specification run separately for men and women, mainly in order to assess whether any of the crisis exposure variables have impacted on mental health differentially across genders. We see that the unconditional age profile is steeper for men, which reflects the fact that the impact of Covid-19 on mental health is concentrated in younger men (with only a small effect on older men), whereas women of all ages were negatively affected. Having symptoms of Covid-19 at the time of the survey appeared to have a much larger effect on the mental health of women: the coefficient

on GHQ score is nearly four times larger. The negative effect of being laid off and working in a shutdown sector (in wave 9) are mainly driven by women: the effects are not statistically significant for men The differential effect of having very young children aged 0-4 is higher for women – the coefficients on GHQ score and the number of problems is around twice those for men (for whom they are not statistically significant) – which may reflect the uneven distribution of childcare responsibilities under lockdown (Andrew et al. 2020).

Table 1. Determinants of change in GHQ-12 relative to wave 9 (robust p-values in parentheses)

	(1) GHQ score				(2)		(3)	
	a. Age and gender		b. All covariates		Number of problems		Any severe problems	
Female	0.80	(0.000)	0.78	(0.000)	0.53	(0.000)	0.05	(0.000)
16-24	2.16	(0.000)	2.13	(0.000)	0.98	(0.001)	0.05	(0.152)
25-34	1.47	(0.000)	1.26	(0.000)	0.56	(0.002)	0.09	(0.000)
35-44	0.63	(0.011)	0.35	(0.187)	0.15	(0.351)	0.03	(0.147)
55-64	0.02	(0.936)	0.28	(0.219)	0.25	(0.063)	0.04	(0.028)
65 and over	0.30	(0.092)	0.75	(0.009)	0.59	(0.000)	0.06	(0.012)
High risk			-0.14	(0.428)	-0.12	(0.242)	0.03	(0.061)
Very high risk			-1.13	(0.005)	-0.66	(0.004)	-0.04	(0.199)
NHS shielding			-0.05	(0.889)	-0.04	(0.863)	0.04	(0.137)
Had Covid-19 symptoms			0.36	(0.118)	0.30	(0.027)	0.02	(0.258)
Has Covid-19 symptoms			2.02	(0.026)	0.96	(0.047)	0.11	(0.052)
Self-employed in Feb			0.03	(0.922)	-0.07	(0.628)	0.02	(0.399)
Not working in Feb			0.06	(0.809)	-0.09	(0.528)	0.03	(0.151)
Hours fell Feb-Apr but not furloughed or laid off			0.25	(0.281)	0.16	(0.220)	0.03	(0.113)
Furloughed Feb-Apr			-0.20	(0.484)	-0.05	(0.776)	0.03	(0.165)
Laid off Feb-Apr			1.79	(0.027)	1.05	(0.022)	0.01	(0.827)
Pay fell Feb-Apr			-0.03	(0.894)	-0.04	(0.779)	-0.00	(0.884)
HH earnings fell Feb-Apr			0.22	(0.285)	0.22	(0.067)	0.02	(0.174)
Shutdown sector in W9			0.73	(0.008)	0.46	(0.004)	0.04	(0.061)
Key worker			-0.20	(0.321)	-0.13	(0.264)	0.00	(0.902)
Caring responsibilities			0.18	(0.200)	0.16	(0.051)	0.01	(0.221)
Youngest child 0-4			0.98	(0.002)	0.47	(0.008)	0.01	(0.708)
Youngest child 5-15			0.40	(0.109)	0.27	(0.060)	0.01	(0.523)
Youngest child 16-18			-0.35	(0.299)	-0.22	(0.257)	-0.01	(0.667)
Constant	0.32	(0.049)	-0.24	(0.605)	0.01	(0.976)	0.03	(0.429)
Observations	11980		11980		11980		11980	
R_2	0.015		0.030		0.030		0.017	
Adjusted R_2	0.014		0.026		0.026		0.013	

Note: Columns 1.b, 2 and 3 also control for highest qualification, ethnicity, region, whether in a couple and whether living with others.

Table 2. Determinants of change in GHQ-12 relative to counterfactual prediction (robust p-values in parentheses)

	(1) GHQ score				(2)		(3)	
	a. Age and gender		b. All covariates		Number of problems		Any severe problems	
Female	0.98	(0.000)	1.01	(0.000)	0.51	(0.000)	0.06	(0.000)
16-24	1.70	(0.000)	1.80	(0.000)	0.80	(0.002)	0.07	(0.057)
25-34	0.99	(0.000)	0.82	(0.005)	0.35	(0.036)	0.10	(0.000)
35-44	0.43	(0.045)	0.17	(0.463)	0.03	(0.806)	0.04	(0.043)
55-64	0.05	(0.767)	0.28	(0.170)	0.21	(0.078)	0.05	(0.003)
65 and over	0.01	(0.963)	0.55	(0.030)	0.37	(0.009)	0.05	(0.007)
High risk			-0.05	(0.776)	-0.09	(0.307)	0.02	(0.060)
Very high risk			-0.34	(0.300)	-0.26	(0.175)	0.01	(0.820)
NHS shielding			0.01	(0.982)	-0.07	(0.685)	0.05	(0.023)
Had Covid-19 symptoms			0.27	(0.187)	0.21	(0.081)	0.02	(0.321)
Has Covid-19 symptoms			2.04	(0.005)	0.99	(0.017)	0.08	(0.098)
Self-employed in Feb			0.15	(0.532)	0.03	(0.798)	0.01	(0.593)
Not working in Feb			-0.32	(0.170)	-0.28	(0.031)	0.01	(0.635)
Hours fell Feb-Apr but not furloughed or laid off			0.26	(0.211)	0.16	(0.181)	0.04	(0.017)
Furloughed Feb-Apr			-0.21	(0.418)	-0.04	(0.787)	0.02	(0.424)
Laid off Feb-Apr			1.89	(0.011)	1.16	(0.007)	0.01	(0.898)
Pay fell Feb-Apr			-0.10	(0.683)	-0.07	(0.611)	-0.01	(0.593)
HH earnings fell Feb-Apr			0.28	(0.149)	0.24	(0.030)	0.03	(0.042)
Shutdown sector in W9			0.57	(0.028)	0.36	(0.014)	0.04	(0.025)
Key worker			-0.36	(0.038)	-0.20	(0.054)	-0.02	(0.130)
Caring responsibilities			0.12	(0.361)	0.11	(0.134)	0.02	(0.124)
Youngest child 0-4			0.95	(0.001)	0.49	(0.003)	0.00	(0.865)
Youngest child 5-15			0.36	(0.121)	0.27	(0.036)	0.02	(0.355)
Youngest child 16-18			-0.43	(0.132)	-0.20	(0.219)	-0.02	(0.459)
Constant	0.12	(0.404)	0.13	(0.761)	0.48	(0.037)	0.06	(0.050)
Observations	11980		11980		11980		11980	
R_2	0.016		0.033		0.033		0.022	
Adjusted R_2	0.016		0.029		0.029		0.018	

Note: Columns 1.b, 2 and 3 also control for highest qualification, ethnicity, region, whether in a couple and whether living with others.

Changes in individual GHQ components

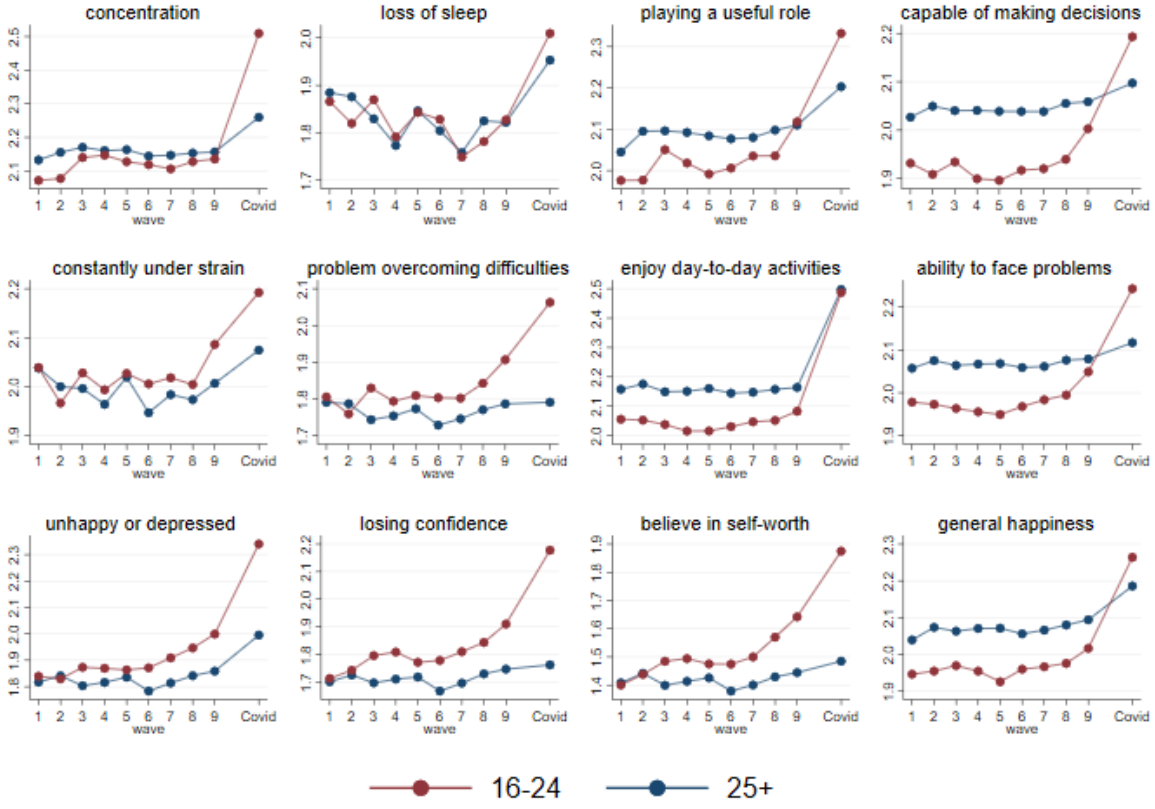
Given that the GHQ-12 mental health scores are calculated from responses in twelve separate dimensions as described in Appendix A, it is possible to consider each of these dimensions separately in order to build an understanding of which types of dimensions are underlying the striking deterioration in mental health scores identified above. Such analysis can only be indicative, since the single questions in each dimension do not capture the dimension with enough precision or granularity to build a definitive picture on what is happening within that dimension. For example, the question on depression in the GHQ-12 questionnaire – 'Have

you recently been feeling unhappy or depressed?' – is not sufficiently detailed to study the effects on depression in its own right. In addition, negative and positive language issues in the wording of individual questions mean that the GHQ-12 scale should be primarily thought of as a unidimensional measure of general mental health rather than a set of subscales representing distinct constructs (Gnambs and Staufenbiel, 2018).

Nevertheless, to conclude our empirical analysis we provide some preliminary descriptive findings along these lines to get some broad idea of the underlying changes in dimensions and to suggest future directions for analysis when more granular data on the various dimensions do become available. Reflecting the more limited goals of this exercise, rather than re-run the detailed multivariate analysis previously carried out for our overall mental health outcomes, we simply chart the main underlying trends.

Figure 5 shows trends in each individual component of the GHQ-12 scale over the course of the Understanding Society study from wave 1 (January 2009-March 2011) up until the Covid module in April 2020, with trends plotted separately for young adults versus those 25 and over. The charts are labelled to reflect the question content (see Appendix A), but coded on a scale of 1 to 4 so that in each case higher values reflect poorer mental health. There was a marked deterioration in measures relating to happiness – enjoying day-to-day activities, general happiness, feeling unhappy or depressed – that is seen across both age groups, though to somewhat different extents. But in many dimensions where young adults saw large declines in mental health – such as feeling capable of making decisions, having problems overcoming difficulties, and the ability to face problems – we do not see any particular deviation from the pre-Covid trend for older adults.

Figure 5. GHQ-12 component scores, waves 1-9 (January 2009 to May 2019) and April 2020 by age group

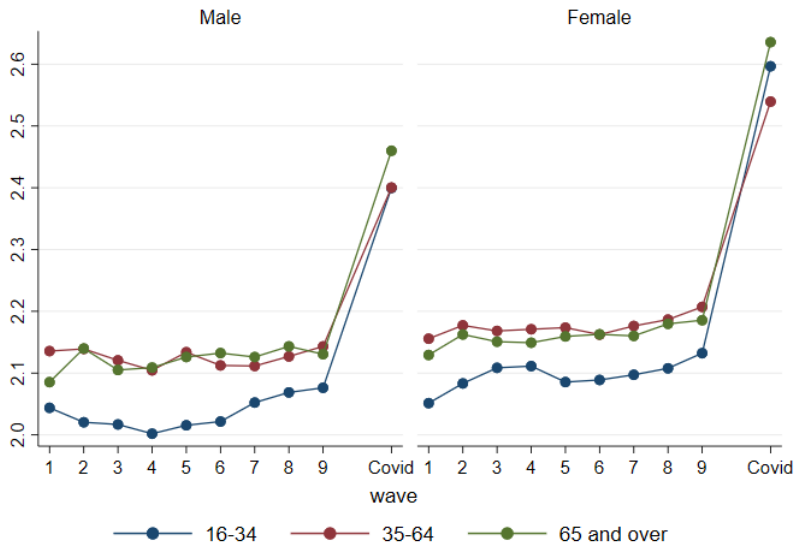


Source: UKHLS waves 1-9 and April Covid-19 survey
Note: The waves ran as follows: wave 1 January 2009-March 2011, wave 2 January 2010-March 2012, wave 3 January 2011-July 2013, wave 4 January 2012-June 2013, wave 5 January 2013-June 2015, wave 6 January 2014-May 2016, wave 7 January 2015-May 2017, wave 8 January 2016-May 2018, wave 9 January 2017-May 2019. Higher values reflect poorer mental health.

For dimensions of particular interest, we also break down trends by the six age-gender groups that we have been working with previously in our analysis. We consider four key dimensions: enjoyment of day to day activities, sleep, depression, and the perception of playing a useful role. Figure 6 indicates that changes in enjoyment of day to day activities were strikingly similar for all age-gender groups, perhaps unsurprisingly since the lockdown and social distancing has affected all our lives and the way that we live them. There is more variability, however, in the evolution of specific dimensions that might be thought more fundamentally important for current or future health such as sleep, depression and even perhaps sense of purpose, which is where we see many of the changes that underlie the age and sex differences

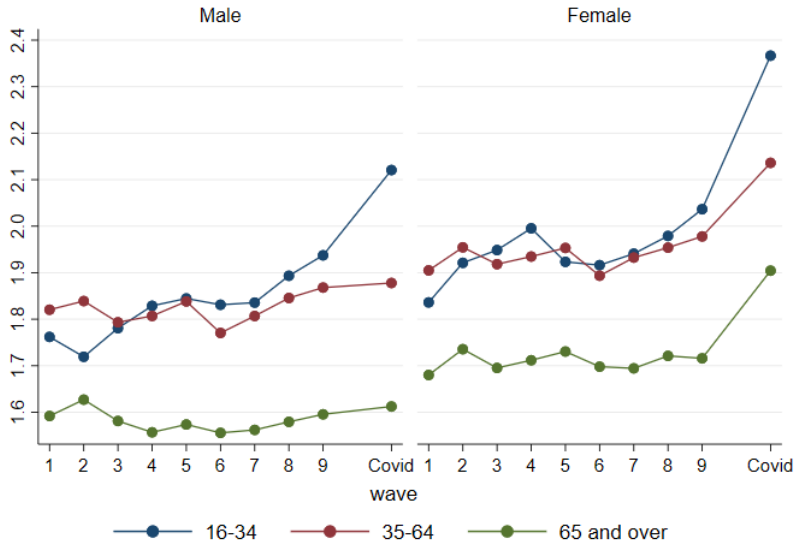
in the overall GHQ score. Increases in feelings of unhappiness or depression have been greater for the young (Figure 7), and reductions in sleep have been apparent for women but not for men, although somewhat similar across age groups within each gender, with the exception of a small rise in difficult sleeping for younger males, as shown in Figure 8. The gender difference in loss of sleep through worry is likely to be particularly important when coupled with recent evidence that has emerged on time-use differences between women and men (see Andrew et al (2020)). Similarly, when it comes to looking at whether people feel they are playing a useful role, it is also the youngest group (both male and female) and the older groups of women where we see the largest deterioration relative to pre-Covid trends.

Figure 6. (Lack of) enjoyment of day-to-day activities, waves 1-9 (January 2009 to May 2019) and April 2020 by gender and age group



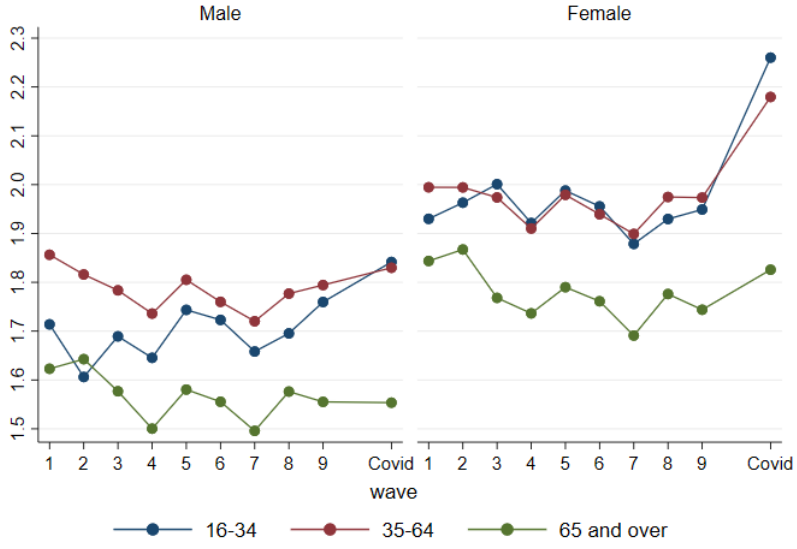
Source: UKHLS waves 1-9 and April Covid-19 survey
Note: The waves ran as follows: wave 1 January 2009-March 2011, wave 2 January 2010-March 2012, wave 3 January 2011-July 2013, wave 4 January 2012-June 2013, wave 5 January 2013-June 2015, wave 6 January 2014-May 2016, wave 7 January 2015-May 2017, wave 8 January 2016-May 2018, wave 9 January 2017-May 2019. Higher values reflect poorer mental health.

Figure 7. Unhappy or depressed, waves 1-9 (January 2009 to May 2019) and April 2020 by gender and age group



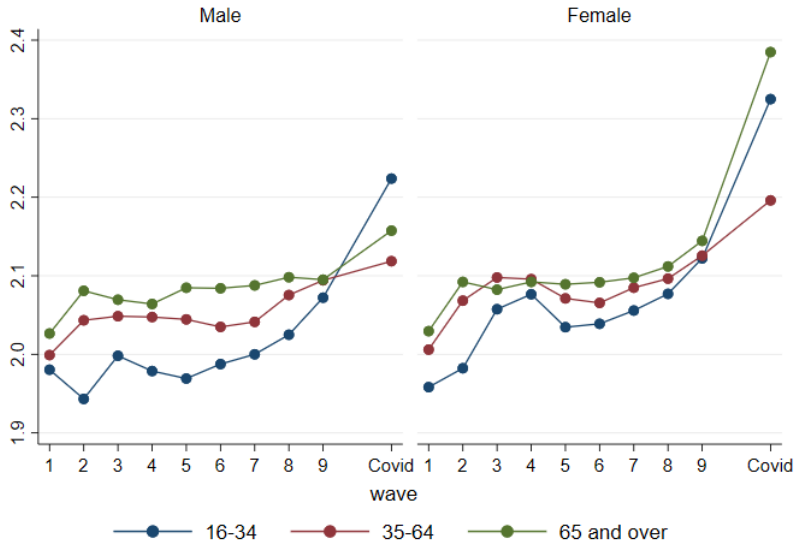
Source: UKHLS waves 1-9 and April Covid-19 survey
Note: The waves ran as follows: wave 1 January 2009-March 2011, wave 2 January 2010-March 2012, wave 3 January 2011-July 2013, wave 4 January 2012-June 2013, wave 5 January 2013-June 2015, wave 6 January 2014-May 2016, wave 7 January 2015-May 2017, wave 8 January 2016-May 2018, wave 9 January 2017-May 2019. Higher values reflect poorer mental health.

Figure 8. Loss of sleep, waves 1-9 (January 2009 to May 2019) and April 2020 by gender and age group



Source: UKHLS waves 1-9 and April Covid-19 survey
Note: The waves ran as follows: wave 1 January 2009-March 2011, wave 2 January 2010-March 2012, wave 3 January 2011-July 2013, wave 4 January 2012-June 2013, wave 5 January 2013-June 2015, wave 6 January 2014-May 2016, wave 7 January 2015-May 2017, wave 8 January 2016-May 2018, wave 9 January 2017-May 2019. Higher values reflect poorer mental health.

Figure 9. (Not) playing a useful role, waves 1-9 (January 2009 to May 2019) and April 2020 by gender and age group



Source: UKHLS waves 1-9 and April Covid-19 survey
Note: The waves ran as follows: wave 1 January 2009-March 2011, wave 2 January 2010-March 2012, wave 3 January 2011-July 2013, wave 4 January 2012-June 2013, wave 5 January 2013-June 2015, wave 6 January 2014-May 2016, wave 7 January 2015-May 2017, wave 8 January 2016-May 2018, wave 9 January 2017-May 2019. Higher values reflect poorer mental health.

Conclusions

The mental health effects of the Covid-19 pandemic have been large, as initially speculated and as previous cross-sectional real-time analysis has shown. Our contribution in this paper has been to set these changes in the context of the distribution of individuals' previous longitudinal trajectories of mental health, to form a prediction of what mental health would have been in April 2020 in the absence of the pandemic, and to use this framework to quantify the size of the effects of the crisis on mental health as measured by the GHQ-12. We show that the effects are large and that they differ both in size and in nature according to which population sub-groups are being looked at, with young people and women experiencing the largest declines in mental health.

Differing patterns and magnitudes are also seen when we look at the number of reported problems or the severity of mental health problems as opposed to just average

scores, and our analysis reveals that the deterioration in average scores is driven by more problems, and more 'severe' problems, as opposed to just a general mild worsening of pre-existing problems for everyone. Indeed, the increase in the prevalence of reporting at least one severe problem, and the increase in between-group inequality in this prevalence, is striking. More generally, as well as worsening mental health on average, the Covid pandemic in the UK can clearly be seen to have increased mental health inequalities.

Our data relate to April 2020 when the UK was in the depths of the full lockdown and Covid deaths were still rising rapidly. Future waves of data on the same respondents, to be collected monthly over the next year, will provide an invaluable resource for documenting month to month variation and tracking the permanence or otherwise of these mental health effects in the context of the longer run mental health trajectories that have been observed for these same individuals over the previous ten years. Thus, researchers will be able to look at the permanence or otherwise of the mental health effects, and at the extent and speed at which different groups are able to bounce back as the distancing restrictions unwind and as government policies aiming to protect groups from the harmful effects of the crisis.

Whilst the pre-existing longitudinal data and the large representative sample from the Understanding Society study are undoubted advantages of the analysis we have been able to carry out here compared to previous work on Covid and mental health, our analysis has nevertheless been limited by only being able to use the somewhat crude GHQ-12 measure of mental health, due to the general-purpose nature of the Understanding Society survey questionnaire. But our results on the magnitude of GHQ changes and on the differences in trends in some of the components driving those changes do suggest that it will be imperative that researchers assess the complex and multifaceted mental health consequences of the pandemic in more detail as more and better data become available. Specifically, soon to be available Covid-specific data modules from the Centre for Longitudinal Studies (CLS) cohort

studies and the English Longitudinal Study of Ageing (ELSA) will provide more granular and detailed measures of specific dimensions of mental health dimensions both in terms of respondents' outcomes and in terms of their past trajectories and these data will facilitate more detailed analysis of outcomes such as depression, anxiety and sleep, and the specific mechanisms that might underlie changes. As this paper has shown, it is important to understand these effects within the contexts of the individuals' longer run trajectories and so research using these and other pre-existing nationally representative longitudinal studies, as well as further research using the Understanding Society Covid modules, should be considered a priority for the next few months as researchers and policymakers alike seek to understand the distribution and permanence of the mental health effects of the crisis in more detail.

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Appendix A: Additional tables and figures

Table A.1. Prediction model (a): age and month effects, separately by gender and age in Wave 9 (p-values in parentheses)

	(1) Men 16-34	(2) Men 35-64	(3) Men 65+	(4) Women 16-34	(5) Women 35-64	(6) Women 65+
Age	-0.01	0.01	-0.03	-0.01	0.01	-0.05
	(0.667)	(0.230)	(0.063)	(0.535)	(0.054)	(0.006)
Age^2	0.00	-0.00	0.00	0.00	-0.00	0.00
	(0.709)	(0.288)	(0.065)	(0.688)	(0.030)	(0.007)
February	-0.00	0.01	0.02	0.00	-0.00	0.00
	(0.868)	(0.165)	(0.167)	(0.797)	(0.855)	(0.893)
March	-0.01	0.02	0.03	0.01	-0.00	-0.01
	(0.747)	(0.074)	(0.021)	(0.464)	(0.749)	(0.644)
April	-0.01	0.01	0.01	0.02	-0.00	0.01
	(0.713)	(0.175)	(0.564)	(0.377)	(0.776)	(0.517)
May	-0.02	0.01	0.01	0.03	-0.00	0.01
	(0.525)	(0.363)	(0.433)	(0.174)	(0.718)	(0.527)
June	0.00	0.01	-0.00	0.01	-0.01	-0.00
	(0.898)	(0.425)	(0.995)	(0.759)	(0.290)	(0.940)
July	-0.01	0.00	0.01	0.02	-0.00	-0.01
	(0.804)	(0.970)	(0.745)	(0.455)	(0.741)	(0.429)
August	-0.04	-0.00	0.02	-0.01	0.00	-0.01
	(0.082)	(0.765)	(0.285)	(0.526)	(0.894)	(0.508)
September	0.01	0.01	0.01	-0.01	0.01	-0.02
	(0.748)	(0.630)	(0.628)	(0.802)	(0.571)	(0.197)
October	-0.01	0.00	0.02	0.02	-0.00	-0.02
	(0.696)	(0.760)	(0.169)	(0.408)	(0.717)	(0.153)
November	0.00	0.01	0.00	0.03	-0.00	-0.02
	(0.954)	(0.528)	(0.996)	(0.119)	(0.835)	(0.242)
December	-0.01	0.01	-0.00	-0.00	0.00	-0.01
	(0.509)	(0.215)	(0.843)	(0.906)	(0.838)	(0.454)
Constant	0.24	-0.17	1.25	0.32	-0.18	1.97
	(0.324)	(0.376)	(0.053)	(0.148)	(0.341)	(0.003)
Observations	8292	26869	13517	11533	34296	15734

Table A.2. Prediction model (b): age, month and year trend, separately by gender and age in Wave 9 (p-values in parentheses)

	(1) Men 16-34	(2) Men 35-64	(3) Men 65+	(4) Women 16-34	(5) Women 35-64	(6) Women 65+
Age	0.03	0.01	-0.03	-0.02	0.02	-0.07
	(0.257)	(0.595)	(0.103)	(0.437)	(0.085)	(0.001)
Age^2	0.00	-0.00	0.00	0.00	-0.00	0.00
	(0.662)	(0.289)	(0.065)	(0.697)	(0.030)	(0.006)
February	-0.01	0.01	0.02	0.01	-0.00	0.00
	(0.714)	(0.159)	(0.165)	(0.777)	(0.826)	(0.777)
March	-0.01	0.02	0.03	0.02	-0.00	-0.00
	(0.544)	(0.069)	(0.021)	(0.436)	(0.702)	(0.821)
April	-0.02	0.02	0.01	0.02	-0.00	0.02
	(0.456)	(0.163)	(0.555)	(0.342)	(0.704)	(0.338)
May	-0.03	0.01	0.01	0.03	-0.01	0.02
	(0.257)	(0.334)	(0.429)	(0.152)	(0.631)	(0.305)
June	-0.01	0.01	0.00	0.01	-0.01	0.01
	(0.592)	(0.387)	(0.978)	(0.672)	(0.241)	(0.662)
July	-0.03	0.00	0.01	0.02	-0.01	-0.00
	(0.312)	(0.876)	(0.728)	(0.389)	(0.617)	(0.887)
August	-0.06	-0.00	0.02	-0.01	-0.00	0.00
	(0.014)	(0.896)	(0.300)	(0.689)	(0.923)	(0.943)
September	-0.02	0.01	0.01	-0.00	0.00	-0.01
	(0.492)	(0.558)	(0.624)	(0.989)	(0.790)	(0.701)
October	-0.04	0.01	0.02	0.02	-0.01	-0.01
	(0.153)	(0.658)	(0.212)	(0.340)	(0.554)	(0.751)
November	-0.03	0.01	0.00	0.04	-0.01	0.00
	(0.232)	(0.477)	(0.940)	(0.123)	(0.624)	(0.934)
December	-0.05	0.01	-0.00	0.00	-0.00	0.01
	(0.065)	(0.244)	(0.944)	(0.840)	(0.854)	(0.583)
Year	-0.04	0.00	0.00	0.01	-0.00	0.02
	(0.034)	(0.731)	(0.902)	(0.635)	(0.581)	(0.102)
Constant	78.63	-6.17	-1.49	-15.34	9.04	-37.91
	(0.033)	(0.724)	(0.947)	(0.642)	(0.588)	(0.121)
Observations	8292	26869	13517	11533	34296	15734

Table A.3. Prediction model (c): age, month, year and covariates, separately by gender and age in Wave 9 (p-values in parentheses)

	(1) Men 16-34	(2) Men 35-64	(3) Men 65+	(4) Women 16-34	(5) Women 35-64	(6) Women 65+
Age	0.03	0.01	-0.03	-0.02	0.03	-0.07
	(0.220)	(0.408)	(0.126)	(0.463)	(0.023)	(0.001)
Age^2	0.00	-0.00	0.00	0.00	-0.00	0.00
	(0.915)	(0.098)	(0.076)	(0.698)	(0.003)	(0.006)
February	-0.01	0.01	0.02	0.00	-0.00	0.00
	(0.624)	(0.150)	(0.184)	(0.787)	(0.824)	(0.848)
March	-0.01	0.02	0.03	0.01	-0.00	-0.01
	(0.502)	(0.055)	(0.027)	(0.458)	(0.691)	(0.635)
April	-0.02	0.02	0.01	0.02	-0.00	0.01
	(0.381)	(0.144)	(0.621)	(0.374)	(0.685)	(0.417)
May	-0.03	0.01	0.01	0.03	-0.01	0.02
	(0.253)	(0.283)	(0.530)	(0.153)	(0.606)	(0.380)
June	-0.01	0.01	-0.00	0.01	-0.01	0.01
	(0.674)	(0.363)	(0.946)	(0.686)	(0.247)	(0.729)
July	-0.02	0.00	0.01	0.02	-0.01	-0.00
	(0.427)	(0.881)	(0.747)	(0.465)	(0.611)	(0.826)
August	-0.06	-0.00	0.02	-0.01	-0.00	0.00
	(0.024)	(0.932)	(0.280)	(0.673)	(0.898)	(0.977)
September	-0.01	0.01	0.01	-0.00	0.00	-0.01
	(0.608)	(0.542)	(0.610)	(0.937)	(0.771)	(0.652)
October	-0.04	0.01	0.02	0.02	-0.01	-0.01
	(0.191)	(0.614)	(0.186)	(0.393)	(0.555)	(0.718)
November	-0.03	0.01	0.00	0.03	-0.01	0.00
	(0.229)	(0.439)	(0.915)	(0.133)	(0.668)	(0.916)
December	-0.05	0.01	-0.00	0.00	-0.00	0.01
	(0.086)	(0.236)	(0.958)	(0.878)	(0.884)	(0.541)
Year	-0.03	0.00	0.00	0.01	-0.00	0.02
	(0.067)	(0.700)	(0.947)	(0.688)	(0.579)	(0.095)
Self-employed pre-Covid	0.02	-0.02	-0.03	0.03	0.01	0.01
	(0.447)	(0.075)	(0.093)	(0.233)	(0.574)	(0.619)
Out of work pre-Covid	0.07	0.04	-0.01	0.03	0.03	0.00
	(0.000)	(0.000)	(0.431)	(0.007)	(0.000)	(0.920)
Single	0.03	0.04	0.01	-0.03	0.03	-0.01
	(0.171)	(0.002)	(0.481)	(0.100)	(0.006)	(0.534)
1 child aged 0-4	-0.00	0.00	-0.06	-0.00	0.01	-0.01
	(0.971)	(0.832)	(0.274)	(0.786)	(0.244)	(0.884)
2+ children aged 0-4	0.01	-0.01	0.16	0.00	0.02	-0.12
	(0.822)	(0.470)	(0.071)	(0.970)	(0.274)	(0.187)
1 child aged 5-15	0.02	-0.01	0.02	0.01	-0.02	-0.05
	(0.405)	(0.293)	(0.651)	(0.630)	(0.062)	(0.404)
2+ children aged 5-15	-0.03	-0.02	-0.02	0.00	-0.03	0.02
	(0.392)	(0.264)	(0.792)	(0.913)	(0.030)	(0.827)
1 child aged 16-18	0.02	-0.01	-0.01	-0.01	-0.01	0.07
	(0.378)	(0.306)	(0.830)	(0.576)	(0.137)	(0.334)
2+ children aged 16-18	0.08	-0.05	-0.09	0.01	0.02	0.04
	(0.306)	(0.024)	(0.253)	(0.854)	(0.295)	(0.837)
North West	0.28	-0.07	0.07	0.06	-0.11	-0.18
	(0.043)	(0.443)	(0.779)	(0.625)	(0.414)	(0.205)
Yorkshire and the Humber	0.17	-0.11	0.15	0.01	0.04	-0.02
	(0.190)	(0.207)	(0.371)	(0.937)	(0.774)	(0.907)
East Midlands	0.19	0.02	-0.05	0.05	0.04	-0.06
	(0.172)	(0.824)	(0.804)	(0.675)	(0.777)	(0.736)
West Midlands	0.11	0.23	-0.20	0.12	0.08	-0.09

	(0.442)	(0.019)	(0.265)	(0.315)	(0.525)	(0.626)
East of England	0.14	0.01	0.08	0.04	0.01	0.02
	(0.278)	(0.877)	(0.651)	(0.749)	(0.957)	(0.885)
London	0.18	-0.01	-0.17	0.02	-0.02	-0.18
	(0.171)	(0.895)	(0.361)	(0.893)	(0.850)	(0.282)
South East	0.21	-0.02	-0.04	0.11	-0.08	-0.23
	(0.105)	(0.833)	(0.810)	(0.350)	(0.499)	(0.162)
South West	0.07	-0.14	-0.09	-0.03	0.02	-0.22
	(0.614)	(0.148)	(0.597)	(0.793)	(0.849)	(0.134)
Wales	0.06	0.07	-0.06	0.12	-0.03	0.01
	(0.666)	(0.535)	(0.759)	(0.386)	(0.822)	(0.967)
Scotland	0.18	-0.07	0.07	0.31	-0.18	-0.20
	(0.224)	(0.504)	(0.828)	(0.094)	(0.217)	(0.425)
Northern Ireland	0.10	-0.13	-0.50	-0.17	-0.03	0.15
	(0.585)	(0.658)	(0.053)	(0.380)	(0.902)	(0.578)
Constant	67.81	-6.95	-0.22	-13.02	8.98	-38.75
	(0.067)	(0.691)	(0.992)	(0.694)	(0.591)	(0.113)
Observations	8281	26846	13508	11520	34262	15729

Table A.4. Distribution of GHQ-12 in Wave 9 (standard deviations in parentheses)

	(1) GHQ score	(2) Number of problems	(3) Any severe problems
All			
Mean	11.40	1.83	0.11
	(5.60)	(3.12)	(0.32)
p10	6	0	0
p25	7	0	0
p50	10	0	0
p75	13	2	0
p90	19	7	1
Sex			
Male	10.82	1.52	0.09
	(5.26)	(2.86)	(0.29)
Female	11.92	2.10	0.13
	(5.84)	(3.31)	(0.33)
Age			
16-24	11.83	2.14	0.16
	(5.92)	(3.08)	(0.36)
25-34	11.98	2.14	0.14
	(5.94)	(3.26)	(0.34)
35-44	11.84	2.02	0.12
	(5.77)	(3.28)	(0.33)
45-54	12.06	2.10	0.12
	(5.92)	(3.41)	(0.33)
55-64	11.45	1.81	0.10
	(5.68)	(3.21)	(0.30)
65 and over	10.21	1.27	0.08
	(4.65)	(2.55)	(0.27)
Household income quintile			
1 (Lowest)	11.92	2.06	0.14
	(5.88)	(3.29)	(0.34)
2	11.35	1.84	0.11
	(5.55)	(3.13)	(0.31)
3	11.35	1.74	0.10
	(5.18)	(2.94)	(0.30)
4	11.03	1.59	0.08
	(5.12)	(2.91)	(0.28)
5 (Highest)	10.80	1.51	0.07
	(4.77)	(2.71)	(0.26)

Table A.5. Determinants of change in GHQ-12 relative to counterfactual prediction, men (robust p-values in parentheses)

	(1) GHQ score				(2)		(3)	
	a. Age		b. All covariates		Number of problems		Any severe problems	
16-24	2.13	(0.001)	2.76	(0.000)	1.28	(0.002)	0.09	(0.109)
25-34	0.60	(0.118)	0.82	(0.046)	0.45	(0.057)	0.11	(0.001)
35-44	0.27	(0.389)	0.21	(0.534)	-0.08	(0.670)	0.03	(0.216)
55-64	-0.20	(0.436)	0.02	(0.957)	0.06	(0.730)	0.02	(0.403)
65 and over	0.15	(0.480)	0.73	(0.039)	0.39	(0.052)	0.05	(0.067)
High risk			-0.31	(0.162)	-0.15	(0.231)	0.02	(0.379)
Very high risk			0.28	(0.527)	0.28	(0.241)	0.04	(0.254)
NHS shielding			0.13	(0.741)	-0.06	(0.791)	0.08	(0.013)
Had Covid-19 symptoms			0.42	(0.141)	0.33	(0.056)	0.04	(0.114)
Has Covid-19 symptoms			0.87	(0.295)	0.56	(0.272)	-0.00	(0.953)
Self-employed in Feb			0.15	(0.640)	0.06	(0.751)	0.03	(0.218)
Not working in Feb			-0.31	(0.352)	-0.22	(0.247)	0.00	(0.859)
Hours fell Feb-Apr but not furloughed or laid off			0.46	(0.156)	0.29	(0.112)	0.03	(0.231)
Furloughed Feb-Apr			-0.26	(0.453)	-0.14	(0.473)	0.02	(0.462)
Laid off Feb-Apr			0.85	(0.312)	0.71	(0.155)	-0.02	(0.828)
Pay fell Feb-Apr			-0.44	(0.178)	-0.20	(0.276)	-0.04	(0.089)
HH earnings fell Feb-Apr			0.44	(0.108)	0.32	(0.039)	0.05	(0.019)
Shutdown sector in W9			-0.20	(0.606)	-0.03	(0.882)	0.03	(0.303)
Key worker			-0.55	(0.023)	-0.28	(0.041)	-0.04	(0.018)
Caring responsibilities			0.13	(0.457)	0.13	(0.191)	0.01	(0.515)
Youngest child 0-4			0.57	(0.186)	0.37	(0.111)	-0.02	(0.629)
Youngest child 5-15			0.38	(0.233)	0.24	(0.171)	0.01	(0.747)
Youngest child 16-18			-0.58	(0.188)	-0.32	(0.237)	0.01	(0.738)
Constant	0.19	(0.308)	0.68	(0.244)	0.78	(0.009)	0.11	(0.018)
Observations	5079		5079		5079		5079	
$R2$	0.010		0.034		0.034		0.029	
Adjusted $R2$	0.009		0.025		0.025		0.020	

Note: Columns 1.b, 2 and 3 also control for highest qualification, ethnicity, region, whether in a couple and whether living with others.

Table A.6. Determinants of change in GHQ-12 relative to counterfactual prediction, women (robust p-values in parentheses)

	(1) GHQ score				(2)		(3)	
	a. Age		b. All covariates		Number of problems		Any severe problems	
16-24	1.43	(0.009)	1.12	(0.050)	0.45	(0.184)	0.05	(0.284)
25-34	1.32	(0.001)	0.82	(0.054)	0.26	(0.276)	0.08	(0.006)
35-44	0.57	(0.059)	0.18	(0.590)	0.14	(0.461)	0.03	(0.142)
55-64	0.27	(0.289)	0.53	(0.066)	0.34	(0.044)	0.07	(0.002)
65 and over	-0.15	(0.514)	0.37	(0.304)	0.32	(0.112)	0.05	(0.077)
High risk			0.23	(0.313)	-0.02	(0.901)	0.04	(0.039)
Very high risk			-0.93	(0.054)	-0.75	(0.008)	-0.02	(0.622)
NHS shielding			-0.17	(0.733)	-0.11	(0.705)	0.02	(0.606)
Had Covid-19 symptoms			0.07	(0.802)	0.09	(0.582)	-0.01	(0.723)
Has Covid-19 symptoms			3.22	(0.003)	1.41	(0.019)	0.16	(0.019)
Self-employed in Feb			0.05	(0.882)	-0.03	(0.899)	-0.02	(0.458)
Not working in Feb			-0.27	(0.396)	-0.32	(0.082)	0.01	(0.555)
Hours fell Feb-Apr but not furloughed or laid off			0.09	(0.726)	0.04	(0.783)	0.04	(0.040)
Furloughed Feb-Apr			-0.23	(0.568)	0.03	(0.900)	0.01	(0.855)
Laid off Feb-Apr			2.47	(0.032)	1.43	(0.030)	0.01	(0.870)
Pay fell Feb-Apr			0.30	(0.373)	0.10	(0.614)	0.02	(0.309)
HH earnings fell Feb-Apr			0.17	(0.522)	0.19	(0.222)	0.01	(0.476)
Shutdown sector in W9			1.09	(0.002)	0.60	(0.002)	0.05	(0.036)
Key worker			-0.22	(0.383)	-0.12	(0.411)	-0.00	(0.932)
Caring responsibilities			0.11	(0.532)	0.09	(0.400)	0.02	(0.132)
Youngest child 0-4			1.19	(0.002)	0.59	(0.012)	0.03	(0.351)
Youngest child 5-15			0.28	(0.374)	0.26	(0.161)	0.02	(0.337)
Youngest child 16-18			-0.37	(0.333)	-0.15	(0.485)	-0.04	(0.170)
Constant	1.05	(0.000)	0.77	(0.192)	0.79	(0.020)	0.08	(0.073)
Region controls	6901		6901		6901		6901	
Observations	0.009		0.036		0.038		0.021	
R_2	0.008		0.029		0.031		0.014	
Adjusted R_2	1.43	(0.009)	1.12	(0.050)	0.45	(0.184)	0.05	(0.284)

Note: Columns 1.b, 2 and 3 also control for highest qualification, ethnicity, region, whether in a couple and whether living with others.

Figure A.1. Mean Wave 9 and predicted mental health, GHQ score

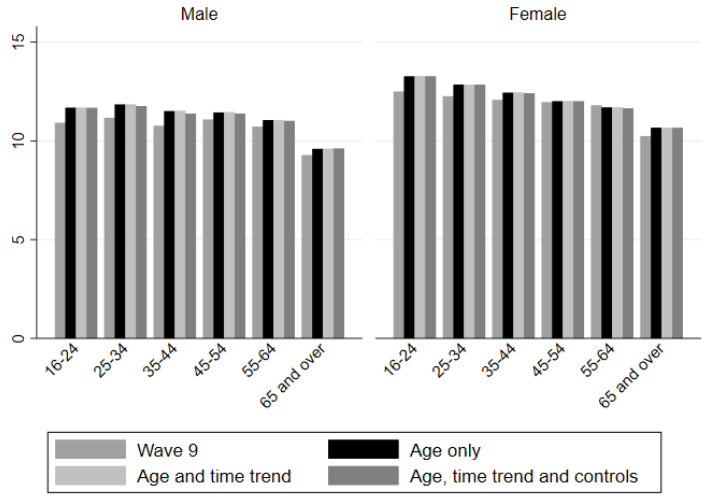


Figure A.2. Mean Wave 9 and predicted mental health, number of problems

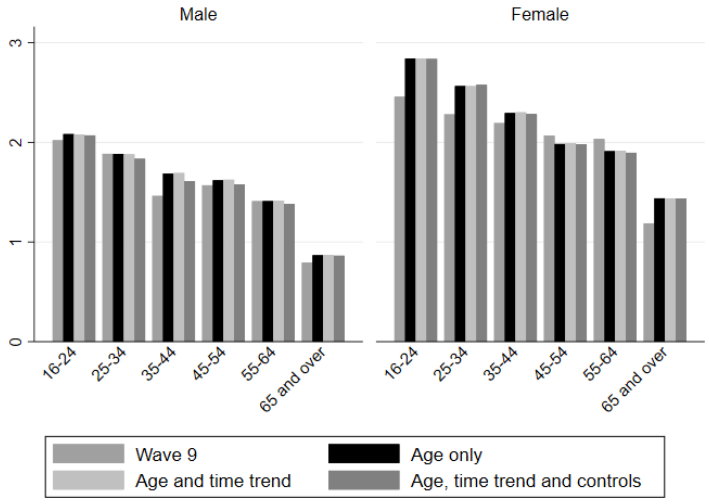
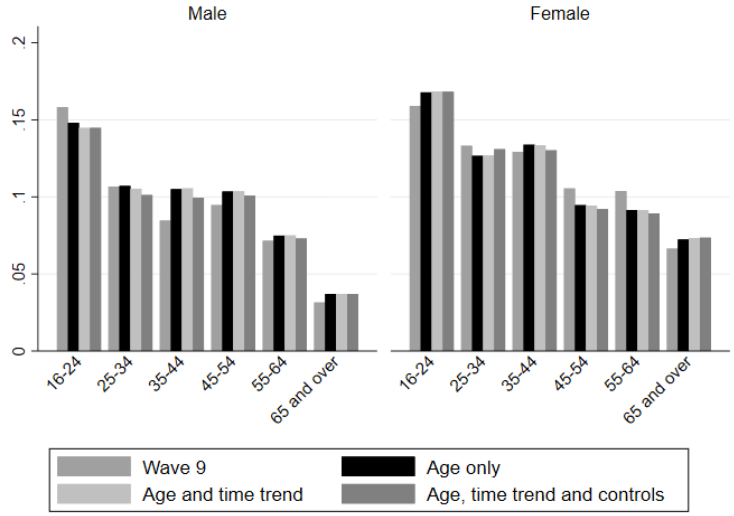


Figure A.3. Mean Wave 9 and predicted mental health, any severe problems



Appendix B: Coding the GHQ-12 measure in Understanding Society

With the exception of wave 1, when it was administered in the face to face interview, the GHQ-12 scale has been collected in the self-completion element of Understanding Society in every wave. Following standard conventions (see Cox et al 1987), the overall value of the GHQ-12 (Likert) measure is computed by assigning values 0 to 3 for each of the four possible response categories to each item, and hence arriving at a value between 0 (least distressed) and 36 (most distressed). The alternative (caseness) way of scoring is to assign a value of 1 to each item where response categories are indicated in italics below, and summing these values, thus resulting in a scale between 0 (least distressed) and 12 (most distressed) that captures the number of dimensions in which individuals are reporting a problem and a greater than usual level of distress. As an additional indicator for our study, and in order to capture a more extreme measure of frequent or severe distress, we compute a simple binary indicator of whether individuals report at least one of the problems 'much more than usual'. Thus our 'severe' indicator takes the value 1 if an individual answers any of the twelve items with a response indicated in bold italics below, and 0 otherwise. The precise question wording on which these derivations are made is the following:

> "The next questions are about how you have been feeling recently…
>
> Have you recently been able to concentrate on whatever you're doing?
> {Better than usual, Same as usual, *Less than usual, **Much less than usual***}
>
> Have you recently lost much sleep over worry?
> {Not at all, No more than usual, *Rather more than usual, **Much more than usual***}
>
> Have you recently felt that you were playing a useful part in things?
> {More so than usual, Same as usual, *Less so than usual, **Much less than usual***}
>
> Have you recently felt capable of making decisions?
> {More so than usual, Same as usual, *Less so than usual, **Much less capable***}
>
> Have you recently felt constantly under strain?
> {Not at all, No more than usual, *Rather more than usual, **Much more than usual***}
>
> Have you felt you couldn't overcome your difficulties?
> {Not at all, No more than usual, *Rather more than usual, **Much more than usual***}
>
> Have you recently been able to enjoy your normal day-to-day activities?
> {More so than usual, Same as usual, *Less so than usual, **Much less than usual***}
>
> Have you recently been able to face up to problems?
> {More so than usual, Same as usual, *Less so than usual, **Much less able***}
>
> Have you recently been feeling unhappy or depressed?
> {Not at all, No more than usual, *Rather more than usual, **Much more than usual***}
>
> Have you recently been losing confidence in yourself?
> {Not at all, No more than usual, *Rather more than usual, **Much more than usual***}
>
> Have you recently been thinking of yourself as a worthless person?
> {Not at all, No more than usual, *Rather more than usual, **Much more than usual***}
>
> Have you recently been feeling happy, all things considered?
> {More so than usual, About the same as usual, *Less so than usual, **Much less than usual***}