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ORIGINAL RESEARCH

Keyworkers' Mental Health during the COVID-19 Infection Peaks: Mapping the Role of Gender and Sector Differences

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Abstract
This study investigates the mental health impact of the COVID-19 pandemic on key workers in the UK, with a focus on gender and sectoral differences. Utilising longitudinal data from the UK Household Longitudinal Study (UKHLS) and its COVID-19 survey, I analyse mental health outcomes during three key infection peaks: May 2020, November 2020, and January 2021. Keyworkers faced heightened exposure to the virus and increased work demands compared to non-keyworkers, with significant implications for their mental health. I employ fixed-effects models to account for pre-pandemic mental health baselines, offering a more nuanced understanding of the psychological toll. My findings reveal stronger associations between keyworker status and mental health decline compared to non-keyworkers, particularly during the pandemic's second peak. Gender disparities were also evident, with female keyworkers reporting stronger associations with distress, exacerbated by increased domestic responsibilities. Sectoral analysis shows that health and social care workers, although at the forefront of the pandemic response, had slightly weaker associations with psychological morbidity compared to those in other key sectors like transportation and retail, due to greater institutional support. These findings highlight the need for tailored mental health interventions for keyworkers, particularly women and those in under-resourced sectors, to mitigate the adverse effects of future pandemics.

Keywords COVID-19 · Keyworkers · Mental health · Gender disparities · Sectoral differences · Longitudinal analysis

1 Introduction

On 11 March 2020, the World Health Organization declared COVID-19 a global pandemic, marking a pivotal moment in modern history. The pandemic infected over 770 million individuals worldwide and claimed almost seven million lives, underscoring its devastating

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human toll (WHO, 2023). Beyond its immediate physical consequences, COVID-19 represented a "diffuse and omnipresent" stressor that reshaped daily life, altering work routines, social relations, and health service delivery (Fiorillo & Gorwood, 2020; Pfefferbaum & North, 2020). Unlike natural disasters, which are spatially and temporally bounded, or wars, where the "enemy" is identifiable, the COVID-19 threat was invisible, universal, and prolonged, generating sustained uncertainty and psychological strain. Early commentaries predicted that lockdowns, quarantine, and social distancing would trigger widespread distress, worsen psychiatric morbidity, and deepen structural inequalities in access to support (Pfefferbaum & North, 2020; Moreno et al., 2020).

UK evidence soon confirmed these predictions. The first national lockdown, imposed on 23 March 2020, severely restricted mobility, childcare, and employment. Population surveys and longitudinal studies consistently documented a sharp rise in common mental disorders during spring 2020, with the steepest deterioration among women, younger adults, those with pre-existing health conditions, and socioeconomically disadvantaged groups (Banks & Xu, 2020; Pierce et al., 2020; Daly et al., 2022; Davillas & Jones, 2021; Chandola et al., 2022). Although partial adaptation occurred as restrictions eased, levels of depression and anxiety remained above pre-pandemic baselines well into subsequent waves, suggesting lasting psychological scarring (Daly et al., 2022; Pierce et al., 2021; Sumner et al., 2023).

Amid these population-wide challenges, keyworkers occupied a distinctive position. Defined by the UK government as those in health and social care, education, transport, retail, delivery, and public safety (Goldblatt & Morrison, 2020), they were required to continue face-to-face duties while many others shifted to furlough or remote work. As a result, they faced elevated risk of exposure, PPE shortages, surging workloads, and the emotional burden of protecting family members from infection (McConnell, 2020; Neville & Shepherd, 2021). International research confirmed high prevalence of anxiety, depression, and sleep disturbance among frontline medical staff (Cai et al., 2020), and systematic reviews extended these concerns to retail, transport, and migrant workers (Giorgi et al., 2020; Moreno et al., 2020). Yet findings on sectoral variation are mixed: some evidence suggests healthcare workers were most affected (Cai et al., 2020), while UK commentators argue that NHS staff benefited from stronger institutional support and symbolic recognition compared to retail or delivery workers, who often had weaker protections (Kinman et al., 2020; Greenberg et al., 2020).

The pandemic also exacerbated gender inequalities. Women were disproportionately concentrated in frontline sectors such as health and social care while also carrying the bulk of unpaid care after school and nursery closures. Global surveys found women more likely to report depression, anxiety, and post-traumatic stress symptoms (Almeida et al., 2020), while UK studies showed sharper declines in women's well-being linked to childcare demands and job insecurity (Adams-Prassl et al., 2020; Warren & Lyonette, 2020). Lockdowns further heightened risks of domestic violence and restricted access to reproductive health services (Almeida et al., 2020).

Despite rapid growth in the literature, key gaps remain. Methodologically, most studies have been cross-sectional or based on short follow-up, limiting the ability to capture within-person change. Few incorporated pre-pandemic baselines, making it difficult to disentangle pandemic-induced shifts from pre-existing disparities (Jia et al., 2020; Cai et al., 2020). Even when longitudinal, many analyses relied on pooled or random effects, which do not adequately control for unobserved heterogeneity. Fixed-effects models are valuable

in this context because they account for stable, individual-specific characteristics, such as baseline mental health or long-standing occupational exposures, that could otherwise bias estimates (Pierce et al., 2020). By comparing each individual to themselves over time, fixed effects allow for a clearer analysis of transitions from pre-pandemic baselines to subsequent infection peaks. Substantively, research has rarely examined how gender intersects with occupational role, leaving unclear whether women keyworkers were doubly disadvantaged. Evidence on sectoral variation also remains inconsistent, particularly when comparing health and social care to other key sectors. Finally, little is known about how inequalities evolved across multiple infection peaks, when government policy, risk perceptions, and institutional support shifted substantially (Daly et al., 2022; Davillas & Jones, 2021).

This study addresses these gaps using longitudinal data from the UK Household Longitudinal Study (UKHLS) and its COVID-19 surveys. By exploiting repeated measures and applying individual fixed-effects models, I control for unobserved time-invariant heterogeneity and model transitions from pre-pandemic baselines to three major infection peaks (May 2020, November 2020, and January 2021). This design strengthens the analysis of within-person change and aligns with recent UK pandemic mental health research adopting similar methods (Pierce et al., 2020).

The study has three aims. The primary aim is to assess whether keyworkers experienced greater deterioration in mental health compared to non-keyworkers during the three infection peaks. Secondary aims are (a) to examine gender heterogeneity, given women's disproportionate exposure to both frontline employment and unpaid domestic responsibilities, and (b) to explore variation between health and social care and other key sectors. In doing so, this paper contributes one of the first longitudinal UK analyses of keyworker mental health across multiple peaks, integrates a gendered lens, and broadens the focus beyond healthcare alone.

Together, these contributions expand our understanding of how occupational and gendered inequalities influenced mental health trajectories during the COVID-19 crisis. The next section situates this study within the wider literature and highlights in more detail the gaps it addresses.

2 Literature Review

2.1 COVID-19 and Mental Health

Pandemics have long been associated with heightened psychological distress, not only through direct infection but also by disrupting social and economic stability. The 2014–2016 Ebola outbreak, for instance, triggered widespread fear and trauma even among those uninfected (O'Leary et al., 2018). The 2002 SARS epidemic similarly left survivors and the broader population with elevated levels of anxiety and depression (Lee et al., 2007). These historical precedents show that pandemics act as multidimensional stressors, destabilising health systems, labour markets, and everyday routines.

COVID-19 reproduced these dynamics at an unprecedented scale. Beyond the physical threat of infection, lockdowns, school and service closures, and restrictions on mobility disrupted daily life and intensified emotional strain (Wetherall et al., 2020). In the UK, these restrictions increased anxiety, exhaustion, financial hardship, and childcare pressures (Fancourt et al., 2021). Early commentaries anticipated that the diffuse and prolonged nature of COVID-19 would provoke sustained psychiatric morbidity and widen inequalities (Pfef-

ferbaum & North, 2020; Moreno et al., 2020; Fiorillo & Gorwood, 2020). These warnings were borne out in longitudinal surveys: common mental disorders rose sharply during the first lockdown (Pierce et al., 2020; Chandola et al., 2022), with deterioration steepest among disadvantaged groups (Banks & Xu, 2020). Although some adaptation followed, levels of distress remained above pre-pandemic baselines, suggesting lasting psychological "scarring" (Daly et al., 2022; Pierce et al., 2021; Sumner et al., 2023).

3 Dynamics Across Infection Peaks

The UK experienced three major infection peaks between 2020 and 2021, each marked by distinct conditions. The first in spring 2020 coincided with acute uncertainty and little preparedness, while later peaks unfolded in the context of vaccine rollout and improved treatments but were complicated by new variants such as Alpha and Delta (Mahase, 2021). Public attitudes shifted between resilience and fatigue as restrictions were reimposed under changing circumstances (Badinlou et al., 2024).

Longitudinal studies mirror these dynamics. Daly et al. (2022) observed partial recovery after restrictions eased, but distress remained above baseline. Sumner et al. (2023) documented declining resilience across two years, while Niedzwiedz et al. (2020) reported sharp increases during the first lockdown followed by fluctuations in later months. These findings highlight the cumulative psychological burden of sustained uncertainty. Yet most studies focus on one episode, leaving limited evidence on how mental health trajectories evolved across successive peaks.

4 The Plight of Keyworkers

Keyworkers sustained essential services—health and social care, education, retail, transport, delivery, and public safety—throughout the crisis (Jia et al., 2020). Unlike those furloughed or able to work remotely, they were required to maintain in-person duties, exposing them to infection risk, heavy workloads, and fears of transmitting the virus to family members (Griffin, 2020; Neville & Shepherd, 2021).

Theoretical insights from role-strain theory help explain these pressures. Goode (1960) and Marks (1977) emphasise that time and energy are finite; when demands across multiple roles intensify, conflicts become likely. Employment continuity offered financial security but simultaneously intensified occupational risks and domestic role conflicts.

Evidence on keyworkers' mental health is mixed. Lindley and Cinzia (2021) found lower distress among keyworkers in the first wave, suggesting protective effects of job security. By contrast, Pierce et al. (2021) and Bu et al. (2022) reported sharper and more persistent deterioration compared to non-keyworkers, while Benassi et al. (2021) found elevated stress among European keyworkers. Ayling et al. (2020) confirmed significantly higher depression, anxiety, and stress relative to pre-pandemic baselines. These inconsistencies reflect differences in design, measures, and timing. Interpreted through role-strain theory, they suggest that job continuity buffered some stressors but escalating work–family conflicts eroded well-being. Few studies, however, examine within-person change from pre-pandemic baselines, leaving uncertainty about how keyworker trajectories unfolded across peaks.

5 The Role of Gender

Gender inequalities compounded these pressures. Women were concentrated in frontline sectors such as health and social care while also carrying the majority of unpaid care when schools and nurseries closed or partially operating (Oreffice & Quintana-Domeque, 2020). Role-strain theory highlights how overlapping increases in paid and unpaid demands stretched finite resources, amplifying strain (Goode, 1960; Marks, 1977). UK studies consistently show women experienced greater declines in well-being (Xue & McMunn, 2021; Davillas & Jones, 2021; Fancourt et al., 2021). Etheridge and Spantig (2022) reported declines more than twice as large for women, while Almeida et al. (2020) linked occupational exposure and caregiving to women's disproportionate vulnerability. For female keyworkers, pressures were especially acute: they faced exposure risks and heavier workloads at work alongside intensified caregiving responsibilities at home (Niedzwiedz et al., 2021). Utzet et al. (2021) found the mental health impact most pronounced among women keyworkers (These findings show how occupational and domestic inequalities converged, but little evidence examines how such gendered burdens varied across multiple infection peaks and in the context of the UK.

6 Sectoral Differences: Health and Social Care vs. Other Key Sectors

A central debate concerns whether health and social care (HSC) workers experienced greater psychological burden than other keyworkers. HSC staff were on the frontline, directly treating patients, working long hours, and often facing moral injury linked to resource scarcity (Spoorthy et al., 2020). Greenberg et al. (2021), in a large survey of NHS staff, found that more than half met thresholds for probable mental health disorders, with nurses and junior doctors particularly affected. International studies confirm these patterns: Cai et al. (2020) reported that over 40% of Chinese healthcare workers displayed anxiety symptoms during the initial outbreak, while a systematic review in PLOS ONE (2021) synthesised global evidence showing consistently high prevalence of depression, anxiety, and insomnia among healthcare professionals.

At the same time, research highlights substantial burdens among keyworkers outside HSC. Bu et al. (2022), using UK longitudinal data, observed high and persistent psychological distress among workers in utilities, food supply, and transport. Mason et al. (2020) documented stress and anxiety among retail staff, who reported both fear of infection and hostility from customers. Chen et al. (2020) found elevated anxiety levels among public transport workers, linked to daily exposure and inadequate protective measures. Although the nature of stressors differed, clinical exposure and moral injury in HSC versus precarious or under-protected working environments in other sectors, the psychological consequences were often comparable.

The literature is therefore divided: some studies emphasise particularly acute distress among HSC staff, while others highlight comparable or greater risks in other public-facing roles. Yet few analyses directly compare these groups within a single framework or examine how their trajectories evolved across multiple infection peaks. In this study, sectoral variation is operationalised by distinguishing between HSC and all other key sectors. While this design does not permit a more granular comparison between specific groups, such as healthcare vs. retail, or transport workers, it nonetheless provides an analytically valuable and policy-relevant contrast given the available data.

6.1 Data and Methods

The data used in this study were drawn from the UKHLS Main Survey and the UKHLS COVID-19 Survey, two longitudinal datasets covering socio-economic information from British households pre- and during the COVID-19 pandemic, respectively. I used Waves 9 and 10 from the main survey; information was based on field interviews conducted between 2018 and 2019. These waves contain rich information on the demographic, socioeconomic, and political attributes of each respondent. The COVID-19 survey was a continuation of the main study, gauging the impact of the pandemic on individuals' work-family lives, as well as their physical and mental health. These interviews were conducted in March, April, May, June, July, September, and November 2020, as well as in January and March 2021. I only used information from May and November 2020 and January 2021, as data from other periods did not contain variables relating to keyworker status and sector.

My sample consisted of individuals from the UKHLS COVID-19 datasets who had participated in either wave 9 or 10 of the main UKHLS survey[1]. Furthermore, I only maintained those individuals in my sample who stayed in paid employment throughout the observation period[2] as the aim of my study was to compare keyworkers with individuals in non-keywork sectors. Lastly, all individuals in my sample stayed in the same sector throughout the observation period. With these specifications, my main samples consisted of 15,602 observations for the general population and 6,343 observations for keyworkers for May 2020. These observations were reduced to 14,136 (general population) and 5,018 (keyworkers) for November 2020 and 13,067 (general population) and 5,763 (keyworkers) for January 2021. I also created subsamples by gender and keywork sector, the details of which can be found in the descriptive statistics section.

7 Variables

7.1 Dependent Variables

For the main outcome variable, I used the 12-item General Health Questionnaire (GHQ-12) from the UKHLS. The GHQ-12 is a widely validated screening instrument designed to detect common mental disorders in community and non-psychiatric clinical settings. In the UKHLS, it is coded as a continuous score ranging from 0 to 36, created by summing responses to the 12 items, with higher values indicating poorer mental health. This continuous specification is widely adopted in research using the UKHLS COVID-19 data (e.g. Pierce et al., 2020, The Lancet Psychiatry), ensuring comparability with previous studies. For individuals in my sample who did not participate in Wave 10 of the main survey, I used their GHQ-12 values from Wave 9.

7.2 Independent Variables

My main independent variable is a time indicator denoting the transition from the pre-pandemic baseline to each of the three major COVID-19 infection peaks in the UK. The

[1] For those individuals who did not have observations in Wave 10 but were present in the COVID dataset, I use Wave 9 values. They constitute 15% of my sample.

[2] I excluded individuals who were furloughed or laid off during the observation period.

pre-pandemic period is captured using Wave 10 (or Wave 9) of the UKHLS (collected 2018–2019, before the onset of COVID-19), coded as 0. For the pandemic period (coded as 1), I ran separate models for each infection peak using the UKHLS COVID-19 surveys: May 2020, November 2020, and January 2021[3]. This design allows comparison of individuals' mental health before the pandemic with their outcomes during each distinct peak, rather than treating the pandemic as a single undifferentiated period.

The subsamples are based on variables including keywork status, gender, and keywork sector. Keywork status is denoted by 0 for non-keyworkers and 1 for keyworkers. Gender is denoted by 0 for men and 1 for women. The keywork sector is denoted by 0 for those in non-HSC sectors and 1 for those in the HSC sector. Due to limited observations, the keywork sector variable could only be split into health and social care sectors and other sectors.

7.3 Control Variables

Key control variables were included to adjust for demographic and household factors known to shape mental health. Age (continuous) was controlled for given life-course differences in psychological distress. Partnership status (binary, 1 = living with a partner) reflects the role of social support, while the number of children was separated into two categorical variables (ages 0–4 and 5–15) to capture age-specific childcare and schooling pressures. Household size and elderly care responsibilities were added to account for broader caregiving demands and intergenerational risks. Interview month was included to capture seasonal effects and survey timing, and lagged GHQ-12 scores controlled for prior mental health. Geographical region was also included to reflect regional differences in infection rates and restrictions.

Most of these controls vary over time (e.g. partnership status, children, household size, care responsibilities, interview month, lagged GHQ), while age changes deterministically and geography is largely fixed. Together, they address key sources of variation that could otherwise confound estimates of the relationship between keyworker status and mental health.

7.4 Analytical Approach

To estimate the association between the COVID-19 pandemic and mental health, I employed fixed-effects (FE) regression models using the balanced panel described above. The outcome was the continuous GHQ-12 score, and the key explanatory variable was an indicator denoting the transition from the pre-pandemic baseline to each infection peak. The FE approach treats each individual as their own control, accounting for as many time-invariant characteristics as possible, which could otherwise bias estimates.

The models take the following form:

$$Y_{it} = \beta_1 Pandemic_t + yX_{it} + \varepsilon_{it}$$

where Y_{it} is the GHQ-12 score for the individual i at time t, $Pandemic_t$ is an indicator for the infection peak under study, X_{it} is a vector of time-varying controls (as described

[3] May 2020 captures the first major mortality peak, with that period being the deadliest of 2020 (ONS); November 2020 reflects the second wave, with deaths elevated though lower than other peaks; and January 2021 corresponds to the most lethal month of the pandemic, with the highest COVID-19 death toll and excess mortality (ONS).

above), α_{it} are individual fixed effects, and ε_{it} is the error term. To examine heterogeneity, I conducted subsample analyses by gender and by keywork sector using the same specification.

Separate models were estimated for May 2020, November 2020, and January 2021 and for analyses across gender and keywork sector. A pooled fixed-effects model with peak indicators and interactions could, in principle, recover the same baseline-to-peak contrasts if the pre-pandemic period were set as the reference category. However, such a specification would require multiple higher-order interactions (for example, peak × gender × sector) to allow effects to vary across phases and groups, leading to a crowded model that is harder to present and more vulnerable to instability in smaller subsamples. Estimating separate models yields the same contrasts in a more direct and transparent way, trading some efficiency for interpretability. In this approach, coefficients can be read simply as the within-person change in psychological distress from the pre-pandemic baseline to the relevant peak. By contrast, pooled models require careful navigation of reference categories and interaction terms, often making it necessary to calculate marginal effects or post-estimation contrasts before the results can be fully understood.

All analyses were conducted in Stata 17, with standard errors clustered at the individual level to account for repeated observations. Survey weights supplied by Understanding Society were applied to maintain representativeness across the combined main and COVID-19 waves. As a robustness check, I re-estimated models excluding respondents who did not participate in Wave 10 (presented in the appendix)(Appendix, Table 5, 6, 7, 8, 9 and 10).

Although well-suited to identifying within-person change, this approach is subject to certain limitations. GHQ-12 scores may be constrained by ceiling effects and selective attrition, where respondents experiencing severe psychological strain exit employment or discontinue survey participation, which likely leads to conservative estimates of the pandemic's impact.

7.5 Descriptive Statistics[4]

Figure 1 illustrates the trends in mean mental health scores for keyworkers and non-keyworkers across four time periods: Wave 9/10 (pre-COVID), May 2020, November 2020, and January 2021. Both keyworkers and non-keyworkers experienced an increase in mean mental health scores (indicating worsening mental health) from Wave 9/10 to May 2020, reflecting the initial impact of the COVID-19 pandemic. However, the increase was more pronounced for keyworkers compared to non-keyworkers. For both groups, the mental health scores continued to rise from May 2020 to November 2020, with keyworkers showing a sharper increase. This suggests that the prolonged effects of the pandemic further exacerbated mental health issues, particularly among keyworkers. By January 2021, there is a slight decline in mean mental health scores for both keyworkers and non-keyworkers. Throughout the observed periods, keyworkers consistently reported higher (worse) mental health scores compared to non-keyworkers[5]. This gap widened during the pandemic's peak in November 2020 and persisted into January 2021, highlighting the disproportionate burden on keyworkers.

[4] Percentage Tables Relating To Observations in all Variables across Wave9/10 and the Three Infection Peaks Can Be Found in the Attached Appendix

[5] Even in Wave 9/10, keyworkers' psychological morbidity was slightly higher than that of non-keyworkers.

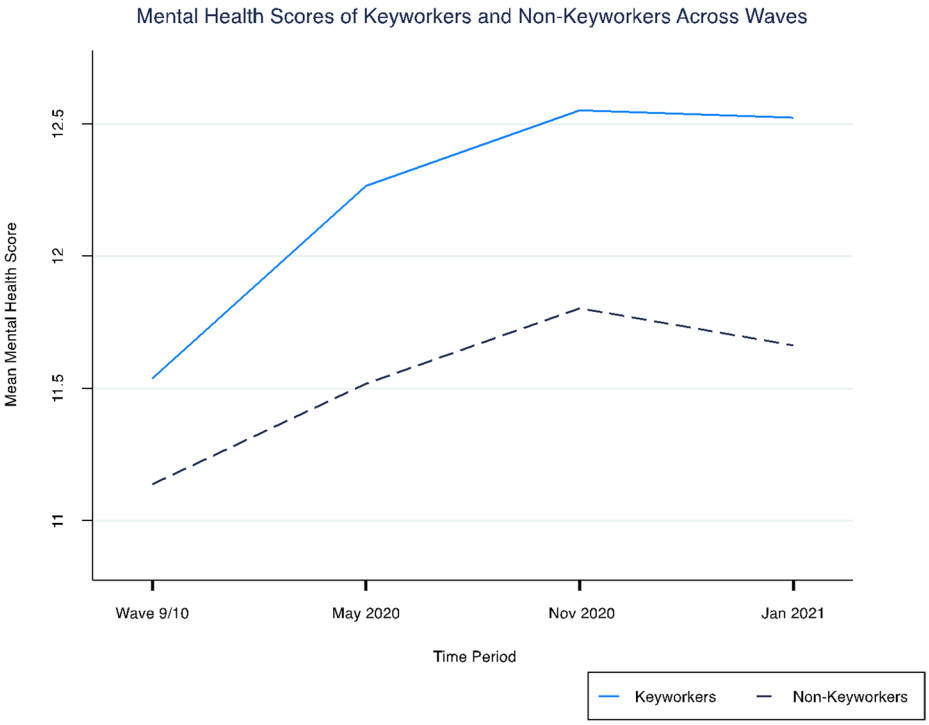

Fig. 1 Raw Statistics on Mental Health Scores of Keyworkers and non-keyworkers across Waves. Note: Higher GHQ values denote worse mental health

Figure 2 illustrates the mean mental health scores for four distinct groups: male non-keyworkers, female non-keyworkers, male keyworkers, and female keyworkers. All groups experienced an increase in mean mental health scores from Wave 9/10 (pre-COVID) to May 2020, indicating a deterioration in mental health during the early stages of the pandemic. Female keyworkers consistently exhibited the highest mean mental health scores, signifying the poorest mental health among the groups, followed by female non-keyworkers. This trend persisted across all periods, suggesting that female keyworkers were the most severely affected by mental health challenges throughout the pandemic.

In contrast, male non-keyworkers had the lowest mean mental health scores, reflecting relatively better mental health outcomes compared to other groups. From May 2020 to November 2020, the mental health scores for all groups continued to rise, with female keyworkers showing the most pronounced increase, reaching a peak in November 2020. This pattern suggests that the prolonged duration of the pandemic further exacerbated mental health issues, particularly for female keyworkers.

By January 2021, there was a slight decrease in mean mental health scores across all groups, though the scores remained higher than their pre-pandemic levels. Throughout all periods, females consistently reported higher mean mental health scores than males, both among keyworkers and non-keyworkers, underscoring the gender disparity in the mental health impact of the pandemic.

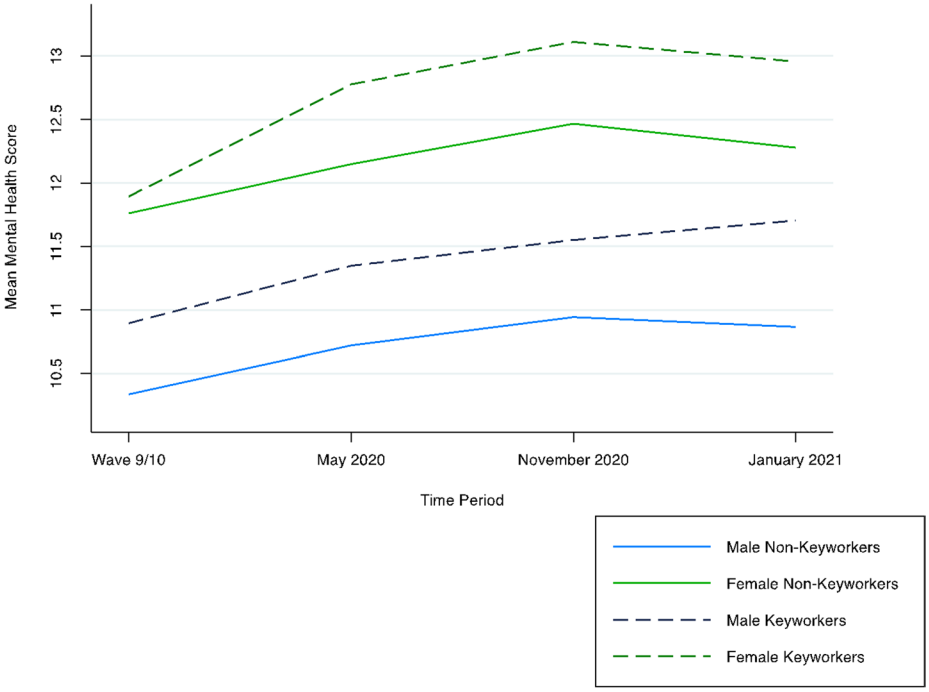

Fig. 2 Raw Statistics on Mental Health Scores of Keyworkers and non-keyworkers by Gender across Waves. Note: Higher GHQ values denote worse mental health

Figure 3 illustrates the mental health scores of keyworkers across different waves, categorised by sector. Both groups experienced an increase in mental health scores from Wave 9/10 (pre-COVID) to May 2020. However, HSC Workers showed a more pronounced increase compared to other frontline/non-HSC workers. Following this initial rise, the scores of both groups stabilised around November 2020 and experienced a slight decline by January 2021. Despite this decline, neither group returned to their pre-COVID mental health levels, indicating persistent mental health challenges. Throughout the observed period, HSC workers consistently exhibited higher mean mental health scores than non-HSC workers.

8 Results

Table 1 reports fixed-effects estimates of the association between the transition to COVID-19 and psychological distress across the three infection peaks for keyworkers and non-keyworkers. Following the first peak (May 2020), both groups experienced significant increases in GHQ-12 relative to pre-pandemic levels. The increase was slightly larger for keyworkers ($\approx$1.261; Model 2) than for non-keyworkers ($\approx$1.179; Model 1), indicating a modestly greater deterioration among keyworkers.

The transition to the second peak (November 2020) was associated with a stronger deterioration in mental health than in May for both groups. The difference between groups widened:

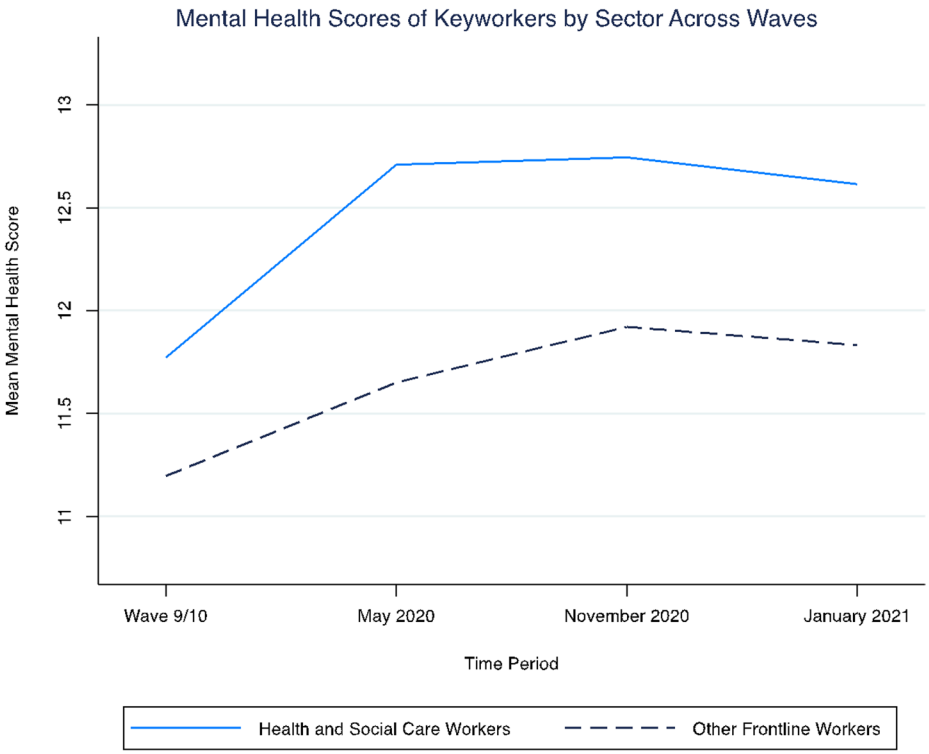

Fig. 3 Raw Statistics on Mental Health Scores of Keyworkers across Different Sectors. Note: Higher GHQ values denote worse mental health

keyworkers showed a much larger increase (1.806; Model 4) than non-keyworkers (1.258; Model 3), suggesting substantially greater strain among keyworkers during this period.

By the third peak (January 2021), non-keyworkers continued to show a significant decline in mental health relative to baseline. For keyworkers, the coefficient fell to 0.476 (Model 6) and was not statistically significant, indicating an attenuation of the association for keyworkers compared with earlier peaks.

In sum, psychological distress rose across the pandemic, with larger effects for keyworkers overall. Among non-keyworkers, the adverse association strengthened over time. Among keyworkers, the increase was evident through the second peak but was no longer statistically significant in January 2021.

Table 2 shows fixed-effects estimates by gender for keyworkers and non-keyworkers across the three infection peaks. In May 2020, all groups experienced significant declines in mental health. The largest increase in psychological morbidity was observed among female non-keyworkers (1.439; Model 3), while the smallest was among male keyworkers (0.988; Model 1). Within the keyworker group, women were more adversely affected than men (Models 2 and 4).

By November 2020, the deterioration in mental health had intensified across all groups. Male keyworkers were most affected, with an increase of around 2 points (Model 6). Female

Table 1 Transition To the COVID-19 Period and GHQ-12 for Keyworkers and Non-keyworkers across Infection Peaks

	May 2020		November 2020		January 2021	
Variable	Non-Keyworkers (Model 1)	Keyworkers (Model 2)	Non-Keyworkers (Model 3)	Keyworkers (Model 4)	Non-Keyworkers (Model 5)	Keyworkers (Model 6)
COVID Period	1.179*** (0.250)	1.261*** (0.372)	1.258*** (0.267)	1.806*** (0.489)	1.297*** (0.302)	0.476 (0.477)
Age	−0.284 (0.152)	0.169 (0.261)	0.099 (0.117)	0.598** (0.254)	0.025 (0.158)	0.357 (0.270)
Living with a partner (Reference: Yes)						
couple (No)	0.059 (0.293)	0.015 (0.468)	−0.288 (0.375)	0.302 (0.539)	−0.361 (0.423)	1.016** (0.472)
Number of Children in HH Aged 0–4 (Reference: 0)						
1	0.083 (0.404)	0.553 (0.443)	0.763** (0.340)	0.754 (0.460)	−0.184 (0.389)	0.831* (0.440)
2 or more	0.559 (0.608)	0.433 (0.769)	0.763 (0.559)	0.911 (0.850)	0.039 (0.667)	1.281 (0.728)
Number of Children in HH Aged 5–15 (Reference: 0)						
1	0.463 (0.335)	0.004 (0.409)	−0.163 (0.264)	−0.628* (0.364)	0.923*** (0.280)	0.392 (0.310)
2 or more	0.495 (0.494)	0.217 (0.576)	−0.158 (0.400)	−0.606 (0.525)	0.961** (0.440)	0.770 (0.481)
HH Size	−0.071 (0.076)	−0.130 (0.097)	−0.078 (0.071)	−0.094 (0.113)	−0.033 (0.080)	−0.309*** (0.111)
Cares for elderly (Reference: Yes)						
No	−0.053 (0.034)	0.037 (0.054)	−0.037 (0.042)	−0.034 (0.074)	−0.044 (0.045)	0.014 (0.066)
Long Standing Illness (Reference: No)						
Yes	0.299** (0.102)	0.623*** (0.197)	0.296*** (0.100)	0.346 (0.217)	0.244** (0.105)	0.319 (0.208)
Interview Period (months)	0.017 (0.015)	−0.031 (0.026)	−0.008 (0.013)	−0.077*** (0.026)	0.004 (0.016)	−0.019 (0.027)
Interview in summer months (Reference: No)						
Yes	−0.327** (0.123)	−0.335 (0.197)	−0.237* (0.123)	−0.360 (0.220)	−0.187 (0.129)	−0.335 (0.215)
Geographical Location (Reference: North-East)						
North-West	−2.821 (2.633)	−8.958*** (0.600)	−0.725 (3.126)	4.011 (3.544)	−5.491** (2.514)	4.388 (3.607)
Yorkshire and The Humber	−1.523 (2.384)	−12.907*** (3.270)	−2.554 (2.887)	−4.143 (4.174)	−3.670 (2.143)	−5.291 (5.347)
East Midlands	−4.156 (2.798)	−11.590*** (2.531)	−1.433 (3.036)	−1.893 (4.062)	−4.435** (2.183)	−0.249 (5.707)
West Midlands	−2.506 (3.029)	−13.397*** (3.161)	−0.945 (3.229)	−0.263 (3.518)	−3.274 (2.806)	−0.794 (3.583)
East of England	−3.933 (2.583)	−16.907*** (2.848)	−2.374 (3.086)	−3.949 (4.325)	−5.071** (2.276)	−5.628 (5.762)
London	−2.294 (2.444)	−5.420** (2.244)	−1.005 (3.113)	1.918 (4.286)	−3.511 (2.102)	−2.992 (5.317)
South-East	−2.043 (2.672)	−19.203*** (2.213)	−1.461 (3.061)	−3.489 (4.441)	−3.403 (2.151)	−2.559 (5.479)
South-West	−2.319 (2.845)	−19.225*** (2.961)	−1.482 (3.068)	−7.874 (4.494)	−5.995*** (2.304)	−3.430 (5.286)

Table 1 (continued)

	May 2020		November 2020		January 2021	
Wales	2.855 (2.819)	−9.690*** (0.663)	3.358 (3.777)	0.011 (3.843)	−10.772*** (3.298)	5.830 (3.774)
Scotland	−3.413 (3.455)	−19.030*** (2.229)	−0.378 (3.406)	−7.385* (4.081)	−5.612** (2.418)	−8.262 (8.336)
Northern Ireland	−5.380** (2.477)	−14.294*** (2.740)	(omitted)	2.943 (8.045)	(omitted)	−3.425 (6.831)
_cons	34.302*** (8.552)	23.552** (11.642)	11.699 (6.997)	−7.154 (12.012)	19.017** (9.071)	3.779 (12.786)
N	15,602	6,343)	14,136	5,018	13,067	5,763)

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from Pre-COVID time to the infection peaks. The Pre-COVID observations are obtained from Wave 9/10 of the UKHLS Main Survey and following that separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets.

keyworkers and female non-keyworkers also experienced substantial increases, though the rise was slightly greater among female non-keyworkers.

In January 2021, non-keyworkers of both genders continued to exhibit significant increases in psychological morbidity compared with baseline. In contrast, the coefficients for male and female keyworkers were not statistically significant, suggesting that the association weakened among keyworkers by the third peak.

Taken together, these results suggest that female non-keyworkers were consistently the most vulnerable group across the pandemic, while male keyworkers experienced a particularly sharp deterioration during the second peak before the association diminished in January 2021.

Table 3 presents the results from models estimating the impact of COVID-19 on psychological morbidity among keyworkers in non-health and social care (non-HSC) sectors compared to those in health and social care (HSC). During the first infection peak in May 2020, both groups experienced significant increases in poor mental health, though the impact was more severe for non-HSC keyworkers. Their psychological morbidity rose by approximately 1.38 points (Model 1), compared to 0.858 points for HSC keyworkers (Model 2).

By November 2020, during the second peak, psychological morbidity increased further across both groups. Again, non-HSC keyworkers were more affected, with a 2.304-point rise from pre-COVID values (Model 3), compared with 0.775 points among HSC keyworkers (Model 4). By contrast, during the January 2021 peak, neither group showed a statistically significant change relative to their pre-pandemic baseline.

Overall, non-HSC keyworkers experienced greater increases in psychological morbidity than their HSC counterparts, particularly during the first two infection peaks. By January 2021, however, the adverse psychological effects appeared to have stabilised in both groups. It is important to note that these estimates may understate the true scale of deterioration, as ceiling effects in the GHQ-12 could mask further increases among those already experiencing high levels of psychological distress.

Table 4 presents the effects of COVID-19 on psychological morbidity for male and female keyworkers across non-HSC and health and social care (HSC) sectors. During the first infection peak in May 2020, both male and female non-HSC keyworkers experienced significant increases in psychological morbidity. The effect was slightly stronger for female non-HSC keyworkers (coefficient of 1.467 in Model 3) than for their male counterparts

Table 2 Transition to the COVID-19 Period and GHQ-12 for Keyworkers and Non-keyworkers Across Infection Peaks and Gender Categories

	May 2020			November 2020			January 2021					
Variable	Male non-key-workers (Model 1)	Male keyworkers (Model 2)	Female non-key-workers (Model 3)	Female keyworkers (Model 4)	Male non-keyworkers (Model 5)	Male keyworkers (Model 6)	Female non-key-workers (Model 7)	Female keyworkers (Model 8)	Male non-key-workers (Model 9)	Male keyworkers (Model 10)	Female non-key-workers (Model 11)	Female keywork-ers (Model 12)
COVID	0.988**	1.171*	1.439***	1.280**	1.081**	2.044***	1.548***	1.523**	1.458***	0.973	1.250***	0.162
	(0.346)	(0.630)	(0.349)	(0.464)	(0.375)	(0.696)	(0.375)	(0.637)	(0.420)	(0.740)	(0.426)	(0.612)
Age	−0.280	−0.252	−0.273	0.361	0.005	0.311	0.280	0.763*	−0.242	0.312	0.205	0.445
	(0.213)	(0.445)	(0.213)	(0.308)	(0.136)	(0.373)	(0.198)	(0.327)	(0.217)	(0.447)	(0.225)	(0.334)
Living with a partner (Reference: Yes)												
(No	−0.142	0.302	0.244	−0.180	−0.876	1.669	0.127	−0.196	0.225	1.950	−0.615	0.740
	(0.415)	(0.666)	(0.403)	(0.598)	(0.755)	(1.104)	(0.426)	(0.613)	(0.730)	(1.096)	(0.522)	(0.509)
Number of Children in HH Aged 0–4 (Reference: 0)												
1	0.443	−0.162	−0.186	1.136*	0.972**	−0.685	0.571	1.697***	0.341	0.748	−0.569	0.911
	(0.564)	(0.648)	(0.560)	(0.604)	(0.476)	(0.645)	(0.474)	(0.618)	(0.529)	(0.644)	(0.544)	(0.588)
2 or more	0.906	−0.787	0.249	1.291	0.206	−0.998	1.086	2.071*	0.867	0.229	−0.575	2.242**
	(0.913)	(1.099)	(0.805)	(1.048)	(0.804)	(1.262)	(0.767)	(1.148)	(0.807)	(1.050)	(0.996)	(0.984)
Number of Children in HH Aged 5–15 (Reference: 0)												
1	0.458	−0.595	0.428	0.379	−0.092	−1.169**	−0.267	−0.357	0.861**	0.169	1.011***	0.706
	(0.521)	(0.721)	(0.436)	(0.502)	(0.396)	(0.541)	(0.351)	(0.468)	(0.394)	(0.535)	(0.390)	(0.375)
2 or more	0.956	−0.151	0.086	0.690	−0.053	−1.117	−0.261	−0.320	0.782	1.556**	1.087*	0.533
	(0.682)	(0.965)	(0.677)	(0.705)	(0.595)	(0.851)	(0.537)	(0.652)	(0.565)	(0.748)	(0.631)	(0.616)
HH Size	0.070	−0.003	−0.161	−0.202	−0.040	0.315	−0.086	−0.339**	0.036	0.076	−0.067	−0.531***
	(0.108)	(0.149)	(0.102)	(0.125)	(0.111)	(0.173)	(0.092)	(0.144)	(0.115)	(0.180)	(0.110)	(0.140)
Cares for elderly (Reference: Yes)												
No	−0.069	−0.092	−0.038	0.101	−0.085	0.032	0.016	−0.040	−0.042	0.029	−0.025	0.031
	(0.053)	(0.104)	(0.044)	(0.061)	(0.079)	(0.117)	(0.049)	(0.094)	(0.069)	(0.130)	(0.058)	(0.077)
Long Standing Illness (Reference: No)												
Yes	−0.140	0.721**	0.711***	0.591**	0.047	0.563	0.593***	0.219	−0.011	0.196	0.506***	0.383
	(0.140)	(0.304)	(0.146)	(0.253)	(0.137)	(0.345)	(0.144)	(0.272)	(0.147)	(0.340)	(0.150)	(0.260)

Table 2 (continued)

	May 2020			November 2020			January 2021					
Interview Period (months)	0.032 (0.021)	0.003 (0.044)	0.004 (0.021)	−0.045 (0.032)	0.005 (0.016)	−0.053 (0.039)	−0.032 (0.020)	−0.086** (0.033)	0.021 (0.022)	−0.013 (0.046)	−0.008 (0.022)	−0.026 (0.033)
Interview in summer months (Reference: No)												
Yes	−0.195 (0.169)	−0.563 (0.303)	−0.452** (0.177)	−0.202 (0.255)	0.054 (0.164)	−0.964*** (0.336)	−0.480*** (0.177)	−0.027 (0.286)	0.073 (0.174)	−0.307 (0.341)	−0.404** (0.186)	−0.342 (0.276)
Geographical Location (Reference: North-East)												
North-West	−2.563 (3.213)	8.167*** (1.647)	−2.288 (3.016)	−9.043*** (0.708)	−9.089** (3.711)	6.513*** (2.455)	1.358 (2.228)	1.350 (0.881)	−2.388 (3.022)	14.088 (8.249)	−4.611* (2.591)	3.313 (2.912)
Yorkshire	−1.210 (1.819)	−8.261*** (2.061)	−1.254 (2.720)	−7.766*** (3.036)	−8.916*** (2.061)	−18.846*** (2.771)	−1.918 (2.288)	0.665 (1.210)	3.454 (2.075)	−4.324 (8.116)	−4.314* (2.308)	−1.391 (4.389)
East Midlands	−4.091 (2.210)	2.508** (1.114)	−3.388 (3.555)	−7.173*** (2.644)	−10.821*** (1.988)	−19.514*** (2.866)	2.949 (2.323)	2.838** (1.145)	2.872 (2.473)	−1.245 (7.966)	−4.853** (2.310)	5.660 (4.794)
West Midlands	2.584 (2.908)	16.839*** (0.483)	−3.640 (3.462)	−12.595*** (2.690)	−2.561 (2.154)	−11.231*** (2.719)	−0.326 (2.353)	3.525*** (0.677)	12.455*** (4.727)	9.022 (8.106)	−5.473** (2.626)	0.779 (2.815)
East of England	−1.579 (0.975)	−6.213*** (1.387)	−4.832 (3.203)	−13.384*** (4.353)	−10.291*** (1.765)	−13.343*** (1.900)	−0.224 (2.569)	0.184 (2.521)	−0.544 (2.514)	−4.461 (7.477)	−3.469 (2.461)	−0.482 (6.912)
London	−0.053 (0.193)	(omitted)	−3.576 (3.000)	−7.636*** (0.748)	−7.944*** (1.922)	−10.771*** (2.341)	0.453 (2.527)	10.044*** (0.737)	3.090 (2.284)	−0.335 (7.497)	−3.256 (2.185)	11.942** (5.206)
South-East	−1.064 (1.696)	−5.166*** (1.335)	−1.554 (3.322)	−15.851*** (3.781)	−8.835*** (0.620)	−12.594*** (2.287)	0.845 (2.429)	3.595 (1.880)	3.257 (2.390)	−3.063 (7.951)	−3.581 (2.319)	4.136 (4.553)
South-West	−1.683 (1.532)	(omitted)	−2.152 (3.414)	−15.099*** (3.770)	−8.884*** (1.623)	(omitted)	0.505 (2.441)	−2.195 (1.762)	2.667 (2.558)	5.581 (8.175)	−6.475*** (2.474)	−1.862 (5.154)
Wales	(omitted)	(omitted)	3.362 (3.159)	−9.480*** (0.808)	−8.816*** (2.375)	(omitted)	8.742*** (2.633)	−3.022** (1.453)	−3.426 (2.997)	(omitted)	−13.333** (5.754)	4.547 (3.024)
Scotland	(omitted)	−5.370*** (1.284)	−3.576 (3.974)	(omitted)	−8.599*** (1.777)	(omitted)	2.442 (3.535)	−3.548* (1.866)	(omitted)	−5.910 (7.978)	−4.976* (2.524)	−5.715 (10.393)
Northern Ireland	(omitted)	(omitted)	−6.664** (3.045)	−18.908*** (0.940)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	1.185 (5.161)

Table 2 (continued)

	May 2020				November 2020				January 2021			
_cons	31.771**	28.950	34.383***	11.905	22.847**	8.241	0.767	−16.137	26.499**	−1.105	10.443	−2.053
	(12.142)	(20.568)	(11.477)	(13.501)	(7.900)	(17.268)	(10.747)	(14.710)	(12.931)	(21.723)	(12.437)	(15.280)
N	7,017	2,226	8,585	4,117	6,401	1,760	7,732	3,256	5.971	1,994	7,093	3,765

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from pre-COVID time to the infection peaks. The pre-COVID observations are obtained from Wave 9/10 of the UKHLS Main Survey and following that separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets.

Table 3 Transition to the COVID-19 Period and GHQ-12 for Keyworkers Across Keywork Sectors

	May 2020		November 2020		January 2021	
Variable	Non-HSC (Model 1)	HSC (Model 2)	Non-HSC (Model 3)	HSC (Model 4)	Non-HSC (Model 5)	HSC (Model 6)
COVID-19 Period	1.384*** (0.472)	0.858* (0.606)	2.304*** (0.593)	0.775* (0.859)	0.525 (0.582)	0.285 (0.819)
Age	0.659** (0.331)	−0.900** (0.456)	0.531* (0.318)	0.626 (0.420)	0.306 (0.327)	0.399 (0.475)
Living with a partner (Reference: Yes)						
No	0.006 (0.557)	−0.114 (0.864)	0.617 (0.684)	−0.489 (0.838)	1.545*** (0.568)	−0.224 (0.827)
Number of Children in HH Aged 0–4 (Reference: 0)						
1	0.490 (0.589)	0.500 (0.657)	1.133** (0.552)	−0.113 (0.816)	1.191** (0.556)	−0.263 (0.614)
2 or more	0.224 (0.970)	0.211 (1.330)	1.082 (1.054)	0.323 (1.363)	1.897** (0.896)	−0.431 (1.179)
Number of Children in HH Aged 5–15 (Reference: 0)						
1	−0.384 (0.453)	0.599 (0.864)	−1.163*** (0.446)	0.241 (0.642)	0.192 (0.377)	0.437 (0.544)
2 or more	0.232 (0.645)	−0.346 (1.182)	−1.273** (0.607)	1.039 (1.084)	0.758 (0.552)	0.244 (0.957)
HH Size	−0.080 (0.122)	−0.285* (0.159)	−0.011 (0.139)	−0.295 (0.191)	−0.272** (0.138)	−0.452** (0.180)
Cares for elderly (Reference: Yes)						
No	0.048 (0.066)	0.012 (0.092)	0.015 (0.083)	−0.147 (0.144)	0.109 (0.074)	−0.176 (0.132)
Long Standing Illness (Reference: No)						
Yes	0.587** (0.243)	0.682** (0.334)	0.437 (0.273)	0.341 (0.346)	0.506 (0.260)	−0.025 (0.343)
Geographical Location (Reference: North-East)						
North West	−9.109*** (0.740)	3.563*** (1.235)	−0.222 (0.881)	4.191*** (1.582)	−0.274 (0.853)	−4.868*** (1.220)
Yorkshire and The Humber	−8.143 (7.492)	1.834 (1.464)	−19.576*** (2.399)	2.974** (1.303)	−9.092 (8.815)	−0.351 (1.392)
East Midlands	−7.771 (6.670)	3.070*** (1.058)	−18.441*** (2.199)	5.195*** (1.624)	−8.236 (8.624)	−5.193*** (1.268)
West Midlands	−11.285*** (1.912)	−3.476*** (1.263)	−18.179*** (2.344)	2.910*** (0.517)	−9.742 (7.279)	2.352*** (0.609)
East of England	−22.130*** (2.417)	4.197*** (0.711)	−20.893*** (1.979)	11.015*** (1.333)	−14.951* (8.022)	6.228*** (1.414)
London	−7.856*** (0.771)	12.552*** (0.953)	−17.237*** (2.001)	8.870*** (0.979)	−15.558** (7.538)	8.685*** (0.737)
South East	−21.136*** (1.902)	−0.973** (0.431)	−18.232*** (0.957)	4.169*** (1.641)	−11.698 (7.274)	−4.436*** (1.150)
South West	−18.853*** (2.591)	(omitted)	−24.626*** (2.870)	5.205*** (1.799)	−12.720* (7.546)	−2.980*** (1.066)
Wales	(omitted)	2.996** (1.332)	(omitted)	(omitted)	(omitted)	−3.516** (1.749)
Scotland	(omitted)	(omitted)	−24.262*** (1.929)	0.922 (1.139)	−22.292** (10.888)	8.570*** (0.968)
Northern Ireland	−17.612*** (2.492)	(omitted)	−4.234 (2.764)	(omitted)	1.989 (8.157)	(omitted)

Table 3 (continued)

	May 2020		November 2020		January 2021	
Variable	Non-HSC (Model 1)	HSC (Model 2)	Non-HSC (Model 3)	HSC (Model 4)	Non-HSC (Model 5)	HSC (Model 6)
Interview Period (months)	−0.073** (0.033)	0.066 (0.047)	−0.079** (0.032)	−0.063 (0.043)	−0.008 (0.032)	−0.041 (0.049)
Interview in summer months (Reference: No)						
Yes	−0.504** (0.237)	−0.060 (0.357)	−0.426 (0.268)	−0.214 (0.390)	−0.219 (0.260)	−0.619 (0.377)
_cons	−0.520 (14.785)	56.944*** (20.809)	8.999 (14.635)	−14.123 (19.404)	12.720 (15.883)	1.397 (21.753)
N	4,551	2,143	3,604	1,752	4,150	1,972

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from pre-COVID time to the infection peaks. The pre-COVID observations are obtained from Wave 9/10 of the UKHLS Main Survey and following that separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets.

(coefficient of 1.331 in Model 1). Among HSC workers, the increases were more modest. Male HSC keyworkers reported a comparatively small rise (coefficient of 0.629), while female HSC keyworkers experienced an increase of around 1 point, lower than the effect observed among non-HSC keyworkers.

By November 2020, during the second infection peak, psychological morbidity rose sharply among non-HSC keyworkers, with coefficients of 2.372 for men and 2.560 for women. These findings suggest that the mental health burden at this stage was particularly acute for non-HSC workers. In contrast, male HSC keyworkers did not show a statistically significant change, while female HSC keyworkers experienced only a modest increase (coefficient of 0.489).

Taken together, the results suggest that non-HSC keyworkers, especially women, faced the steepest deterioration in mental health across the first two COVID-19 peaks, whereas HSC workers showed smaller and less consistent effects. By highlighting these sectoral and gendered differences, the findings underline the unequal distribution of psychological strain across the keyworker workforce during the pandemic.

Additional analytical checks, limited to individuals with available Wave 10 pre-COVID baseline values, corroborate the results presented above and attest to their robustness.

9 Discussion and Conclusion

This study provides nuanced insights into the association between COVID-19 and the mental health of keyworkers compared to non-keyworkers, offering a detailed comparison that foregrounds gender and sectoral differences. While previous research has broadly examined the pandemic's impact across population groups, this study contributes by focusing specifically on keyworkers, those at the frontline of the government's COVID-19 response, and by tracking how their experiences unfolded across successive infection peaks.

The findings show an association between the pandemic and worsening mental health for both keyworkers and non-keyworkers, in line with existing studies that document

Table 4 Transition to the COVID-19 Period and GHQ-12 for Keyworkers Across Keywork Sectors by Gender

	May 2020				November 2020				January 2021			
Variable	Male - non-HSC (Model 1)	Male – HSC (Model 2)	Female - non-HSC (Model 3)	Female – HSC (Model 4)	Male - non-HSC (Model 5)	Male – HSC (Model 6)	Female - non-HSC (Model 7)	Female – HSC (Model 8)	Male - non-HSC (Model 9)	Male – HSC (Model 10)	Female - non-HSC (Model 11)	Female – HSC (Model 12)
COVID-19 Period	1.331** (0.664)	0.629* (1.617)	1.467** (0.644)	1.024* (0.651)	2.372** (0.769)	2.627 (1.826)	2.560** (0.857)	0.489+ (0.943)	0.998 (0.815)	1.094 (1.868)	0.385 (0.807)	0.239 (0.901)
Age	0.284 (0.508)	−2.960** (1.271)	0.979** (0.399)	−0.585 (0.480)	0.388 (0.406)	−0.625 (0.979)	0.651 (0.453)	0.711 (0.462)	0.566 (0.487)	−1.278 (1.091)	0.193 (0.438)	0.720 (0.517)
Living with a partner (Reference: Yes)												
No	0.510 (0.708)	0.210 (1.238)	−0.182 (0.735)	0.009 (0.960)	2.045 (1.235)	1.539 (2.589)	0.109 (0.798)	−0.641 (0.878)	1.042 (1.182)	5.369** (2.181)	1.648** (0.635)	−0.682 (0.838)
Number of Children in HH Aged 0–4 (Reference: 0)												
1	−0.291 (0.684)	0.133 (1.898)	1.393 (1.020)	0.824 (0.681)	−0.182 (0.636)	−4.596** (2.040)	2.229** (0.843)	0.761 (0.815)	0.958 (0.702)	−0.857 (1.354)	1.473 (0.862)	−0.153 (0.679)
2 or more	−0.798 (1.135)	−2.435 (3.463)	1.521 (1.569)	0.712 (1.439)	0.016 (1.254)	−11.157** (4.673)	2.261 (1.692)	1.934 (1.361)	0.877 (1.110)	−4.042 (3.309)	3.545** (1.374)	0.428 (1.233)
Number of Children in HH Aged 5–15 (Reference: 0)												
1	−0.722 (0.601)	0.375 (2.795)	0.141 (0.643)	0.652 (0.807)	−1.306** (0.591)	−0.155 (1.474)	−0.643 (0.643)	0.172 (0.700)	−0.205 (0.594)	1.438 (1.487)	0.910 (0.492)	0.329 (0.565)
2 or more	−0.076 (0.886)	−2.179 (3.342)	0.972 (0.901)	0.247 (1.125)	−0.757 (0.898)	−4.122 (2.955)	−1.153 (0.811)	1.616 (1.153)	1.553 (0.813)	−0.004 (2.008)	0.603 (0.753)	0.351 (1.042)
HH Size	0.163 (0.157)	−0.408 (0.390)	−0.227 (0.169)	−0.198 (0.177)	0.435** (0.206)	0.444 (0.343)	−0.222 (0.189)	−0.397 (0.214)	0.126 (0.203)	−0.214 (0.383)	−0.517*** (0.185)	−0.455** (0.197)
Cares for elderly (Reference: Yes)												
No	−0.005 (0.101)	−0.486 (0.384)	0.098 (0.085)	0.085 (0.088)	0.099 (0.138)	0.120 (0.163)	0.054 (0.109)	−0.173 (0.155)	0.018 (0.135)	0.048 (0.360)	0.166 (0.087)	−0.188 (0.136)
Long Standing Illness (Reference: No)												
Yes	0.538 (0.332)	1.310 (0.812)	0.557 (0.348)	0.575 (0.362)	0.429 (0.382)	0.782 (0.853)	0.317 (0.376)	0.174 (0.375)	0.074 (0.366)	0.328 (0.974)	0.744** (0.363)	−0.125 (0.357)

Table 4 (continued)

	May 2020				November 2020				January 2021			
Variable	Male - non-HSC (Model 1)	Male – HSC (Model 2)	Female - non-HSC (Model 3)	Female – HSC (Model 4)	Male - non-HSC (Model 5)	Male – HSC (Model 6)	Female - non-HSC (Model 7)	Female – HSC (Model 8)	Male - non-HSC (Model 9)	Male – HSC (Model 10)	Female - non-HSC (Model 11)	Female – HSC (Model 12)
Interview Period (months)	−0.027 (0.050)	0.204 (0.126)	−0.105** (0.041)	0.045 (0.050)	−0.060 (0.042)	0.013 (0.098)	−0.094** (0.045)	−0.064 (0.047)	−0.028 (0.050)	0.099 (0.120)	0.000 (0.043)	−0.065 (0.052)
Interview in summer months (Reference: No)												
Yes	−0.610* (0.320)	−0.046 (0.881)	−0.399 (0.338)	−0.009 (0.386)	−1.024*** (0.362)	−0.714 (1.023)	−0.044 (0.384)	−0.050 (0.421)	−0.142 (0.370)	−0.820 (0.902)	−0.289 (0.361)	−0.449 (0.411)
_cons	3.343 (23.428)	154.225*** (57.191)	−24.737 (17.265)	43.732** (21.748)	−3.132 (18.893)	45.381 (46.016)	−9.739 (19.889)	−13.244 (21.137)	−11.810 (22.471)	76.149 (51.500)	10.052 (19.050)	−11.969 (23.428)
N	1,997	373	2,554	1,770	1,583	316	2,018	1,436	1,779	361	2,367	1,611

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from pre-COVID time to the infection peaks. The pre-COVID observations are obtained from Wave 9/10 of the UKHLS Main Survey and following that separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets.

population-wide increases in psychological distress (Pierce et al., 2020, Lob et al., 2020, Connor et al., 2020). The widespread disruption of daily life, combined with uncertainty and fear of infection, plausibly contributed to this deterioration (Fancourt et al., 2021). Global studies similarly highlight that pandemics heighten mental health risks, with elevated depression, anxiety, and trauma symptoms recorded across Europe, Asia, and North America (Almeida et al., 2020; Pfefferbaum & North, 2020; Moreno et al., 2020; Fiorillo & Gorwood, 2020; Giorgi et al., 2020; Cai et al., 2020). Positioning the UK evidence alongside these findings underlines that while distress was universally heightened, its distribution across occupations and genders reflected specific national labour markets and policy responses.

Within the UK, my results indicate that keyworkers were associated with sharper declines in mental health than non-keyworkers, particularly during the first and second peaks, consistent with Pierce et al. (2021) and Bu et al. (2022). These associations may reflect greater occupational exposure and workload demands, alongside broader social pressures such as grief, disrupted childcare, and economic uncertainty (Ayling et al., 2020). The widening of the keyworker–non-keyworker gap between May and November 2020 coincided with shortages of PPE, rising hospitalisations, and the emergence of new variants, factors that could help explain but were not directly tested in my analysis. Gendered patterns are also evident in the results. The models show stronger associations between COVID-19 peaks and poor mental health for women than for men, consistent with prior research (Davillas & Jones, 2021; Xue & McMunn, 2021; Almeida et al., 2020). In May 2020, female non-keyworkers displayed the steepest increase in psychological morbidity, followed by female keyworkers. This association may be linked to additional unpaid domestic responsibilities, but my data cannot directly test this mechanism. That female keyworkers fared slightly better than female non-keyworkers may be partly explained by the relative stability of employment and limited childcare access provided to essential staff (Zamarro, 2020), though such mechanisms remain interpretative. By contrast, the results show that male keyworkers were most adversely affected in November 2020. Their concentration in transport, delivery, and healthcare sectors, combined with inadequate protective measures (Chen et al., 2020) and cultural norms around masculinity , may have contributed to this finding, but again these links cannot be directly established with my data. By January 2021, associations weakened for keyworkers overall, possibly reflecting adaptation and the early stages of vaccine rollout (Bu et al., 2022).

Sectoral comparisons also reveal distinct associations. The models show larger increases in psychological morbidity for non-HSC keyworkers relative to HSC workers during the first two peaks, consistent with Bu et al. (2022). This complicates debates that focus narrowly on healthcare staff (Greenberg et al., 2021; Spoorthy et al., 2020). While HSC workers reported high absolute levels of distress pre-pandemic, the sharper increases among non-HSC workers may reflect differences in recognition, PPE availability, or precarity. These explanations remain plausible but untested within this study.

Role-strain theory (Goode, 1960; Marks, 1977) provides a useful lens for interpreting these associations. The alternating vulnerability of female and male keyworkers across peaks reflects the idea that time and energy are finite resources. For women, overlapping paid and unpaid demands during the first peak stretched these resources most severely. For men, intensified sectoral workloads during the second peak combined with social expecta-

tions of stoicism to produce heightened vulnerability. These links between theory and findings strengthen interpretation, although they remain at the level of explanation rather than empirically tested mechanisms.

The study also has some limitations. While fixed-effects models reduce bias from unobserved time-invariant characteristics, they cannot account for unmeasured time-varying confounders. Policy shifts, workplace conditions, and access to vaccination in early 2021 may all have shaped outcomes. Because these factors were not operationalised in the dataset, the results should be interpreted as robust associations rather than causal effects.

Another limitation concerns the outcome measure. The GHQ-12, while well validated, provides only a general indicator of psychological distress. It does not distinguish between specific conditions such as anxiety, depression, or trauma, limiting comparability with studies that employ more targeted instruments such as the PHQ-9 or GAD-7.

A further constraint arises from missing data and attrition. Although robustness checks were undertaken, imputing Wave 9 GHQ-12 scores for respondents missing Wave 10 values introduces the possibility of measurement error. Similarly, fluctuations in sample size across peaks may have reduced statistical power and biased estimates if missingness was not random.

Another limitation is the treatment of occupational categories. Due to small sample sizes, keyworker roles had to be collapsed into a binary variable distinguishing between HSC and non-HSC workers. This necessarily obscures differences between more specific occupational groups, such as transport, retail, or education, and may mask sector-specific vulnerabilities.

Finally, the study is limited by its national focus. The UK's distinctive institutional context, including the NHS, furlough policies, and school closures, shaped both keyworker and non-keyworker experiences. These findings may therefore not be generalisable to other countries with different healthcare systems, labour market structures, or cultural norms.

Even within these limits, the results highlight structural inequities. The disproportionate association between keyworker status and poor mental health for women reflects how occupational exposure interacted with entrenched gendered divisions of labour, echoing broader evidence that COVID-19 deepened inequalities in mental health and support access (Almeida et al., 2020; Moreno et al., 2020). The heightened association among male keyworkers in the second peak highlights overlooked vulnerabilities and challenges assumptions about resilience in male-dominated roles. These results underscore the importance of policies that address gendered burdens and redistribute care responsibilities.

In policy terms, the study supports calls for comprehensive support for all categories of keyworkers, not only healthcare staff. Ensuring adequate protection, recognition, and mental health provision across essential sectors is vital to resilience in future crises. As Fiorillo and Gorwood (2020) argue, sustained investment in mental health infrastructure is necessary to counter burnout, stigma, and long-term psychiatric demand.

Finally, future research should build on these associations by incorporating more detailed data on intersecting identities such as ethnicity and socioeconomic status, as well as sector-specific risks. Household-level analyses could examine how divisions of paid and unpaid work shaped outcomes, while cross-national comparisons could test whether similar associations emerge under different policy and institutional contexts. Longer-term follow-ups are also needed to trace whether distress among keyworkers persisted, adapted, or diminished beyond the acute crisis.

Appendix

Table 5 Weighted descriptive statistics (in %) for categorical variables in the observation period

	Wave 9/10	Wave 1	Wave 2	Wave 3
	2017/2019	May 2020	November 2020	January 2021
Individuals in keywork professions				
Yes	28	29	28	29
No	72	71	72	71
Gender				
Men	41	42	42	42
Women	59	58	58	58
Living with a partner				
Yes	71	69	70	71
No	29	31	30	29
Number of Children Aged 0–4				
None	90	90	93	94
One	9	8	5	5
Two or More	1	2	2	1
Number of Children Aged 5–15				
None	77	77	80	82
One	12	12	11	10
Two or More	11	11	9	8
Cares for Elderly				
Yes	7	7	7	8
No	93	93	93	92
Long-term Health Condition				
Yes	35	40	44	43
No	65	60	56	57
Geographical Location				
Northeast	3	3	4	4
Northwest	10	10	10	10
Yorkshire and The Humber	8	8	8	8
East Midlands	8	8	8	7
West Midlands	9	9	8	9
East of England	10	11	10	10
London	10	9	9	9
Southeast	14	14	15	14
Southwest	9	10	10	10
Wales	6	6	6	6
Scotland	9	8	9	9
Northern Ireland	4	4	4	4
No. of observations	14,257	13,927	11,329	11,156

Table 6 Weighted descriptive statistics for continuous variables in the observation period

	Wave 9/10	Wave 1	Wave 2	Wave 3
Variables				
Overall GHQ-12	10.1 (5.4)	12.2 (6.1)	13.1 (6.0)	12.6(6.1)
Strain Levels	2.1 (0.5)	2.4 (0.7)	2.3(0.6)	2.2(0.6)
Depressed or Unhappy	1.2 (0.4)	1.9 (0.8)	2.0(0.8)	2.0(0.8)
Age	48.2(16.4)	50.3(16.1)	53.4(15.6)	54.6(15.7)
Household Size	2.7(1.3)	0.5(0.9)	0.5(0.8)	0.5(0.9)
No. of observations	14,257	13,927	11,329	11,156

Robustness Checks

Understanding Society mainstage survey (excluding those whose Wave 9 values were used as a baseline for the pre-COVID-19 situation).

Table 7 Transition to the COVID-19 period and GHQ-12 for keyworkers and Non-Keyworkers across infection peaks

Variable	May 2020 Non-Keyworkers (Model 1)	May 2020 Keyworkers (Model 2)	Nov 2020 Non-Keyworkers (Model 3)	Nov 2020 Keyworkers (Model 4)	Jan 2021 Non-Keyworkers (Model 5)	Jan 2021 Key-workers (Model 6)
COVID Period	1.168*** (0.256)	1.249*** (0.368)	1.242*** (0.272)	1.793*** (0.495)	1.283*** (0.309)	0.471 (0.482)
Age	−0.278 (0.155)	0.165 (0.263)	0.103 (0.120)	0.590** (0.259)	0.027 (0.161)	0.353 (0.273)
Living with a partner (No)	0.061 (0.296)	0.017 (0.470)	−0.283 (0.379)	0.309 (0.544)	−0.358 (0.427)	1.010** (0.476)
Children 0–4: 1	0.086 (0.409)	0.550 (0.447)	0.759** (0.344)	0.758 (0.464)	−0.181 (0.392)	0.826* (0.443)
Children 0–4: 2+	0.555 (0.612)	0.430 (0.773)	0.759 (0.563)	0.907 (0.854)	0.041 (0.673)	1.276 (0.732)
Children 5–15: 1	0.460 (0.338)	0.006 (0.411)	−0.160 (0.268)	−0.624* (0.367)	0.919*** (0.283)	0.388 (0.313)
Children 5–15: 2+	0.492 (0.497)	0.219 (0.579)	−0.155 (0.403)	−0.601 (0.528)	0.957** (0.443)	0.765 (0.485)
HH Size	−0.072 (0.078)	−0.129 (0.099)	−0.079 (0.073)	−0.095 (0.115)	−0.034 (0.082)	−0.306*** (0.113)
Cares for elderly (No)	−0.052 (0.035)	0.038 (0.055)	−0.036 (0.043)	−0.035 (0.075)	−0.043 (0.046)	0.015 (0.067)
Long-standing illness (Yes)	0.301** (0.104)	0.620*** (0.200)	0.293*** (0.102)	0.349 (0.220)	0.246** (0.108)	0.321 (0.210)

Table 7 (continued)

Variable	May 2020 Non-Keyworkers (Model 1)	May 2020 Keyworkers (Model 2)	Nov 2020 Non-Keyworkers (Model 3)	Nov 2020 Keyworkers (Model 4)	Jan 2021 Non-Keyworkers (Model 5)	Jan 2021 Key-workers (Model 6)
Interview period (months)	0.017 (0.016)	−0.031 (0.027)	−0.007 (0.014)	−0.078*** (0.027)	0.005 (0.017)	−0.018 (0.028)
Interview in summer (Yes)	−0.325** (0.125)	−0.333 (0.200)	−0.234* (0.125)	−0.362 (0.223)	−0.184 (0.131)	−0.331 (0.218)
North-West	−2.810 (2.650)	−8.950*** (0.605)	−0.718 (3.133)	4.006 (3.552)	−5.482** (2.522)	4.381 (3.614)
Yorkshire & Humber	−1.520 (2.392)	−12.899*** (3.276)	−2.548 (2.894)	−4.136 (4.182)	−3.662 (2.150)	−5.284 (5.355)
East Midlands	−4.150 (2.804)	−11.582*** (2.538)	−1.429 (3.043)	−1.888 (4.070)	−4.427** (2.191)	−0.246 (5.714)
West Midlands	−2.500 (3.036)	−13.389*** (3.169)	−0.940 (3.236)	−0.261 (3.526)	−3.268 (2.814)	−0.790 (3.591)
East of England	−3.927 (2.590)	−16.899*** (2.855)	−2.369 (3.093)	−3.943 (4.333)	−5.063** (2.283)	−5.622 (5.770)
London	−2.288 (2.451)	−5.415** (2.249)	−1.000 (3.120)	1.923 (4.294)	−3.505 (2.109)	−2.987 (5.324)
South-East	−2.038 (2.678)	−19.196*** (2.220)	−1.456 (3.068)	−3.484 (4.448)	−3.397 (2.158)	−2.553 (5.486)
South-West	−2.314 (2.852)	−19.218*** (2.968)	−1.478 (3.075)	−7.868 (4.502)	−5.987*** (2.311)	−3.423 (5.293)
Wales	2.849 (2.826)	−9.683*** (0.670)	3.352 (3.784)	0.014 (3.851)	−10.765*** (3.305)	5.823 (3.781)
Scotland	−3.407 (3.463)	−19.023*** (2.236)	−0.373 (3.413)	−7.378* (4.089)	−5.605** (2.426)	−8.255 (8.344)
Northern Ireland	−5.374** (2.484)	−14.288*** (2.747)	(omitted)	2.949 (8.053)	(omitted)	−3.419 (6.839)
_cons	34.210*** (8.560)	23.480** (11.700)	11.640 (7.010)	−7.120 (12.030)	18.960** (9.080)	3.740 (12.790)
N	13,262	5,391	12,016	4,265	11,107	4,899

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from pre-COVID time to the infection peaks. The Pre-COVID observations are obtained from Wave 10 of the UKHLS Main Survey and following that separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets

Table 8 Transition to the COVID-19 period and GHQ-12 for keyworkers and Non-Keyworkers across infection peaks and gender categories

Variable	May 2020 Male Non-Key (M1)	May 2020 Male Key (M2)	May 2020 Female Non-Key (M3)	May 2020 Female Key (M4)	Nov 2020 Male Non-Key (M5)	Nov 2020 Male Key (M6)	Nov 2020 Female Non-Key (M7)	Nov 2020 Female Key (M8)	Jan 2021 Male Non-Key (M9)	Jan 2021 Male Key (M10)	Jan 2021 Female Non-Key (M11)	Jan 2021 Female Key (M12)
COVID	0.976**	1.159*	1.427***	1.268**	1.069**	2.031***	1.536***	1.511**	1.446***	0.962	1.239***	0.158
	(0.352)	(0.638)	(0.356)	(0.471)	(0.381)	(0.704)	(0.381)	(0.645)	(0.427)	(0.749)	(0.433)	(0.619)
Age	−0.276	−0.248	−0.269	0.355	0.006	0.307	0.277	0.756*	−0.238	0.308	0.202	0.440
	(0.219)	(0.451)	(0.219)	(0.313)	(0.140)	(0.378)	(0.203)	(0.333)	(0.222)	(0.452)	(0.230)	(0.340)
Partner (No)	−0.138	0.297	0.239	−0.185	−0.869	1.660	0.123	−0.191	0.221	1.940	−0.610	0.734
	(0.421)	(0.673)	(0.409)	(0.605)	(0.762)	(1.111)	(0.432)	(0.620)	(0.736)	(1.104)	(0.528)	(0.515)
Children 0–4: 1	0.437	−0.166	−0.182	1.128*	0.965**	−0.679	0.565	1.688***	0.337	0.741	−0.563	0.905
	(0.570)	(0.655)	(0.566)	(0.610)	(0.482)	(0.652)	(0.480)	(0.624)	(0.535)	(0.651)	(0.550)	(0.595)
Children 0–4: 2+	0.899	−0.782	0.245	1.284	0.202	−0.991	1.080	2.061*	0.861	0.226	−0.570	2.234**
	(0.920)	(1.106)	(0.812)	(1.055)	(0.811)	(1.270)	(0.774)	(1.155)	(0.814)	(1.057)	(1.003)	(0.991)
Children 5–15: 1	0.452	−0.589	0.422	0.374	−0.090	−1.161**	−0.263	−0.352	0.855**	0.167	1.005***	0.701
	(0.527)	(0.728)	(0.442)	(0.508)	(0.402)	(0.547)	(0.357)	(0.474)	(0.400)	(0.541)	(0.396)	(0.381)
Children 5–15: 2+	0.950	−0.147	0.081	0.685	−0.051	−1.110	−0.257	−0.315	0.776	1.549**	1.081*	0.528
	(0.689)	(0.972)	(0.684)	(0.712)	(0.601)	(0.858)	(0.543)	(0.659)	(0.571)	(0.755)	(0.637)	(0.622)
HH Size	0.068	−0.004	−0.158	−0.199	−0.039	0.312	−0.084	−0.334**	0.035	0.074	−0.065	−0.526***
	(0.110)	(0.151)	(0.104)	(0.127)	(0.113)	(0.176)	(0.094)	(0.147)	(0.117)	(0.183)	(0.112)	(0.143)
Cares elderly (No)	−0.068	−0.091	−0.037	0.099	−0.084	0.031	0.015	−0.039	−0.041	0.028	−0.024	0.030
	(0.054)	(0.105)	(0.045)	(0.062)	(0.080)	(0.119)	(0.050)	(0.095)	(0.070)	(0.132)	(0.059)	(0.078)
Illness (Yes)	−0.138	0.716**	0.706***	0.586**	0.046	0.559	0.589***	0.215	−0.010	0.194	0.502***	0.379
	(0.142)	(0.309)	(0.149)	(0.258)	(0.139)	(0.350)	(0.147)	(0.277)	(0.149)	(0.345)	(0.153)	(0.265)
Interview months	0.031	0.002	0.004	−0.044	0.005	−0.052	−0.031	−0.085**	0.020	−0.013	−0.008	−0.025
	(0.022)	(0.045)	(0.022)	(0.033)	(0.017)	(0.040)	(0.021)	(0.034)	(0.023)	(0.047)	(0.023)	(0.034)
Summer (Yes)	−0.192	−0.559	−0.448**	−0.199	0.053	−0.957***	−0.476***	−0.026	0.072	−0.305	−0.400**	−0.338
	(0.171)	(0.309)	(0.180)	(0.259)	(0.166)	(0.342)	(0.180)	(0.291)	(0.176)	(0.347)	(0.189)	(0.281)
North-West	−2.554	8.153***	−2.280	−9.031***	−9.078**	6.502***	1.352	1.346	−2.380	14.070	−4.603*	3.306
	(3.220)	(1.654)	(3.023)	(0.716)	(3.719)	(2.463)	(2.235)	(0.889)	(3.030)	(8.260)	(2.598)	(2.919)
Yorkshire	−1.205	−8.251***	−1.248	−7.755***	−8.905***	−18.833***	−1.913	0.662	3.448	−4.314	−4.307*	−1.385
	(1.826)	(2.069)	(2.727)	(3.044)	(2.069)	(2.779)	(2.296)	(1.218)	(2.083)	(8.124)	(2.316)	(4.397)

Table 8 (continued)

Variable	May 2020 Male Non-Key (M1)	May 2020 Male Key (M2)	May 2020 Female Non-Key (M3)	May 2020 Female Key (M4)	Nov 2020 Male Non-Key (M5)	Nov 2020 Male Key (M6)	Nov 2020 Female Non-Key (M7)	Nov 2020 Female Key (M8)	Jan 2021 Male Non-Key (M9)	Jan 2021 Male Key (M10)	Jan 2021 Female Non-Key (M11)	Jan 2021 Female Key (M12)
East Midlands	−4.084 (2.217)	2.502** (1.121)	−3.381 (3.562)	−7.163*** (2.652)	−10.810*** (1.996)	−19.502*** (2.874)	2.943 (2.330)	2.832** (1.152)	2.866 (2.481)	−1.239 (7.974)	−4.846** (2.318)	5.653 (4.802)
West Midlands	2.578 (2.915)	16.827*** (0.491)	−3.633 (3.469)	−12.584*** (2.698)	−2.555 (2.162)	−11.220*** (2.727)	−0.322 (2.361)	3.520*** (0.685)	12.440*** (4.735)	9.010 (8.114)	−5.466** (2.634)	0.774 (2.823)
East of England	−1.574 (0.982)	−6.205*** (1.394)	−4.826 (3.211)	−13.374*** (4.361)	−10.280*** (1.773)	−13.331*** (1.908)	−0.220 (2.577)	0.182 (2.529)	−0.540 (2.522)	−4.454 (7.485)	−3.462 (2.469)	−0.478 (6.920)
London	−0.052 (0.199)	(omitted)	−3.570 (3.008)	−7.626*** (0.756)	−7.933*** (1.930)	−10.759*** (2.349)	0.451 (2.535)	10.030*** (0.745)	3.085 (2.292)	−0.332 (7.505)	−3.249 (2.193)	11.930** (5.214)
South-East	−1.060 (1.703)	−5.158*** (1.342)	−1.550 (3.330)	−15.839*** (3.789)	−8.824*** (0.628)	−12.582*** (2.295)	0.842 (2.437)	3.590 (1.888)	3.252 (2.398)	−3.057 (7.959)	−3.575 (2.327)	4.130 (4.561)
South-West	−1.678 (1.539)	(omitted)	−2.146 (3.422)	−15.088*** (3.778)	−8.873*** (1.631)	(omitted)	0.503 (2.449)	−2.191 (1.770)	2.662 (2.566)	5.574 (8.183)	−6.468*** (2.482)	−1.857 (5.162)
Wales	(omitted)	(omitted)	3.356 (3.167)	−9.470*** (0.816)	−8.805*** (2.383)	(omitted)	8.732*** (2.641)	−3.018** (1.461)	−3.421 (3.005)	(omitted)	−13.326** (5.762)	4.541 (3.032)
Scotland	(omitted)	−5.362*** (1.292)	−3.570 (3.982)	(omitted)	−8.588*** (1.785)	(omitted)	2.438 (3.543)	−3.543* (1.874)	(omitted)	−5.903 (7.986)	−4.969* (2.532)	−5.709 (10.401)
Northern Ireland	(omitted)	(omitted)	−6.658** (3.053)	−18.897*** (0.948)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	1.181 (5.169)
_cons	31.690** (12.220)	28.870 (20.650)	34.300*** (11.550)	11.830 (13.580)	22.770** (7.970)	8.180 (17.350)	0.760 (10.810)	−16.190 (14.780)	26.420** (13.010)	−1.120 (21.800)	10.370 (12.510)	−2.060 (15.360)
N	5,965	1,892	7,297	3,500	5,441	1,496	6,572	2,768	5,075	1,695	6,029	3,200

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from pre-COVID time to the infection peaks. The pre-COVID observations are obtained from Wave 10 of the UKHLS Main Survey and following that separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets

Table 9 Transition to the COVID-19 period and GHQ-12 for keyworkers across keywork sectors

Variable	May 2020 Non-HSC (M1)	May 2020 HSC (M2)	Nov 2020 Non-HSC (M3)	Nov 2020 HSC (M4)	Jan 2021 Non-HSC (M5)	Jan 2021 HSC (M6)
COVID-19 Period	1.372*** (0.478)	0.846* (0.612)	2.288*** (0.601)	0.764* (0.866)	0.518 (0.588)	0.278 (0.826)
Age	0.652** (0.336)	−0.892** (0.462)	0.524* (0.323)	0.618 (0.426)	0.302 (0.332)	0.394 (0.481)
Partner (No)	0.009 (0.563)	−0.119 (0.870)	0.609 (0.691)	−0.495 (0.844)	1.538*** (0.574)	−0.229 (0.833)
Children 0–4: 1	0.484 (0.595)	0.493 (0.664)	1.127** (0.559)	−0.118 (0.822)	1.184** (0.563)	−0.268 (0.621)
Children 0–4: 2+	0.219 (0.978)	0.207 (1.338)	1.076 (1.061)	0.318 (1.371)	1.889** (0.903)	−0.437 (1.186)
Children 5–15: 1	−0.380 (0.458)	0.594 (0.870)	−1.156*** (0.451)	0.237 (0.648)	0.188 (0.382)	0.432 (0.550)
Children 5–15: 2+	0.228 (0.651)	−0.341 (1.188)	−1.266** (0.613)	1.034 (1.091)	0.753 (0.557)	0.239 (0.963)
HH Size	−0.082 (0.124)	−0.288* (0.162)	−0.013 (0.141)	−0.298 (0.194)	−0.276** (0.140)	−0.456** (0.183)
Cares elderly (No)	0.047 (0.067)	0.011 (0.093)	0.014 (0.084)	−0.149 (0.146)	0.108 (0.075)	−0.178 (0.134)
Illness (Yes)	0.582** (0.248)	0.677** (0.339)	0.432 (0.278)	0.338 (0.352)	0.501 (0.265)	−0.028 (0.349)
North West	−9.095*** (0.747)	3.552*** (1.243)	−0.218 (0.889)	4.183*** (1.591)	−0.270 (0.861)	−4.859*** (1.229)
Yorkshire	−8.131 (7.503)	1.828 (1.471)	−19.561*** (2.408)	2.969** (1.310)	−9.081 (8.827)	−0.348 (1.399)
East Midlands	−7.758 (6.681)	3.063*** (1.065)	−18.426*** (2.207)	5.187*** (1.632)	−8.225 (8.636)	−5.184*** (1.275)
West Midlands	−11.272*** (1.919)	−3.468*** (1.270)	−18.165*** (2.353)	2.904*** (0.524)	−9.731 (7.290)	2.347*** (0.616)
East of England	−22.115*** (2.424)	4.189*** (0.718)	−20.878*** (1.987)	11.006*** (1.341)	−14.939* (8.034)	6.221*** (1.421)
London	−7.844*** (0.778)	12.540*** (0.960)	−17.222*** (2.009)	8.861*** (0.987)	−15.546** (7.549)	8.678*** (0.744)
South East	−21.124*** (1.909)	−0.969** (0.438)	−18.219*** (0.965)	4.163*** (1.648)	−11.687 (7.285)	−4.429*** (1.157)
South West	−18.840*** (2.598)	(omitted)	−24.611*** (2.879)	5.198*** (1.807)	−12.709* (7.557)	−2.974*** (1.073)
Wales	(omitted)	2.990** (1.339)	(omitted)	(omitted)	(omitted)	−3.511** (1.755)
Scotland	(omitted)	(omitted)	−24.247*** (1.937)	0.918 (1.146)	−22.279** (10.900)	8.563*** (0.975)
N. Ireland	−17.600*** (2.499)	(omitted)	−4.228 (2.771)	(omitted)	1.984 (8.168)	(omitted)
Interview months	−0.072** (0.034)	0.065 (0.048)	−0.078** (0.033)	−0.062 (0.044)	−0.008 (0.033)	−0.040 (0.050)
Summer (Yes)	−0.500** (0.239)	−0.059 (0.360)	−0.423 (0.271)	−0.212 (0.393)	−0.217 (0.262)	−0.615 (0.380)
_cons	−0.515 (14.850)	56.901*** (20.880)	8.983 (14.695)	−14.110 (19.474)	12.708 (15.945)	1.391 (21.820)
N	3,868	1,822	3,063	1,489	3,528	1,676

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from pre-COVID time to the infection peaks. The pre-COVID observations are obtained from Wave 10 of the UKHLS Main Survey and following that separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets

Table 10 Transition to the COVID-19 period and GHQ-12 for keyworkers across keywork sectors by gender

Variable	May 2020 Male non-HSC (M1)	May 2020 Male HSC (M2)	May 2020 Female non-HSC (M3)	May 2020 Female HSC (M4)	Nov 2020 Male non-HSC (M5)	Nov 2020 Male HSC (M6)	Nov 2020 Female non-HSC (M7)	Nov 2020 Female HSC (M8)	Jan 2021 Male non-HSC (M9)	Jan 2021 Male HSC (M10)	Jan 2021 Female non-HSC (M11)	Jan 2021 Female HSC (M12)
COVID-19 Period	1.318** (0.671)	0.616* (1.624)	1.455** (0.651)	1.012* (0.658)	2.361** (0.776)	2.613 (1.835)	2.548** (0.864)	0.482+ (0.951)	0.986 (0.822)	1.082 (1.876)	0.379 (0.814)	0.234 (0.909)
Age	0.279 (0.514)	−2.951** (1.279)	0.971** (0.405)	−0.590 (0.486)	0.383 (0.412)	−0.619 (0.987)	0.646 (0.459)	0.705 (0.469)	0.560 (0.494)	−1.271 (1.099)	0.190 (0.444)	0.715 (0.524)
Living with a partner (No)	0.504 (0.715)	0.205 (1.246)	−0.177 (0.742)	0.007 (0.967)	2.033 (1.243)	1.529 (2.598)	0.106 (0.805)	−0.636 (0.886)	1.037 (1.190)	5.354** (2.190)	1.642** (0.641)	−0.677 (0.846)
Children 0–4: 1	−0.295 (0.691)	0.130 (1.906)	1.386 (1.027)	0.818 (0.688)	−0.186 (0.642)	−4.585** (2.049)	2.221** (0.849)	0.756 (0.822)	0.951 (0.709)	−0.852 (1.362)	1.467 (0.869)	−0.150 (0.686)
Children 0–4: 2+	−0.803 (1.142)	−2.425 (3.472)	1.514 (1.576)	0.707 (1.447)	0.014 (1.261)	−11.141** (4.682)	2.254 (1.699)	1.927 (1.368)	0.872 (1.118)	−4.031 (3.318)	3.537** (1.381)	0.423 (1.241)
Children 5–15: 1	−0.718 (0.607)	0.370 (2.804)	0.138 (0.649)	0.648 (0.814)	−1.300** (0.597)	−0.152 (1.483)	−0.639 (0.649)	0.169 (0.707)	−0.202 (0.600)	1.432 (1.495)	0.905 (0.498)	0.326 (0.571)
Children 5–15: 2+	−0.073 (0.892)	−2.170 (3.351)	0.966 (0.907)	0.243 (1.132)	−0.753 (0.904)	−4.111 (2.964)	−1.148 (0.817)	1.610 (1.160)	1.548 (0.819)	−0.002 (2.016)	0.599 (0.759)	0.348 (1.048)
HH Size	0.161 (0.160)	−0.403 (0.397)	−0.224 (0.172)	−0.194 (0.184)	0.430** (0.211)	0.439 (0.349)	−0.218 (0.192)	−0.392 (0.220)	0.124 (0.209)	−0.210 (0.389)	−0.512*** (0.191)	−0.451** (0.203)
Cares for elderly (No)	−0.004 (0.102)	−0.481 (0.391)	0.096 (0.086)	0.084 (0.089)	0.097 (0.139)	0.118 (0.166)	0.053 (0.110)	−0.171 (0.158)	0.017 (0.136)	0.047 (0.366)	0.164 (0.088)	−0.186 (0.139)
Long-standing illness (Yes)	0.534 (0.338)	1.302 (0.820)	0.552 (0.354)	0.571 (0.368)	0.425 (0.388)	0.776 (0.861)	0.313 (0.382)	0.171 (0.381)	0.072 (0.372)	0.325 (0.982)	0.739** (0.369)	−0.123 (0.363)
Interview period (months)	−0.026 (0.051)	0.202 (0.128)	−0.103** (0.042)	0.044 (0.051)	−0.059 (0.043)	0.012 (0.100)	−0.093** (0.046)	−0.063 (0.048)	−0.027 (0.051)	0.098 (0.122)	−0.001 (0.044)	−0.064 (0.053)
Interview in summer (Yes)	−0.604* (0.326)	−0.045 (0.889)	−0.395 (0.344)	−0.008 (0.393)	−1.018*** (0.368)	−0.709 (1.031)	−0.042 (0.390)	−0.049 (0.428)	−0.141 (0.376)	−0.814 (0.910)	−0.287 (0.367)	−0.446 (0.418)
_cons	3.330 (23.500)	154.180*** (57.270)	−24.680 (17.330)	43.700** (21.820)	−3.120 (18.960)	45.340 (46.090)	−9.710 (19.950)	−13.210 (21.200)	−11.770 (22.540)	76.100 (51.570)	10.020 (19.110)	−11.940 (23.500)
N	1,697	317	2,171	1,505	1,346	268	1,715	1,221	1,512	307	2,012	1,369

*$p<0.05$, **$p<0.01$, ***$p<0.001$. The models analyse changes in mental health associated with transitioning from pre-COVID time to the infection peaks. The pre-COVID observations are obtained from Wave 9/10 of the UKHLS Main Survey and following that, separate transition models are run for each infection peak. All statistics have been rounded to three decimal places. Standard errors are in the brackets

Data Availability All data used in this study are openly available via the UK Data Service. Specifically, the analyses presented in the manuscript (including those underlying all tables and figures) are based on Understanding Society: The UK Household Longitudinal Study. The data can be accessed through the UK Data Service under the following citation:
University of Essex, Institute for Social and Economic Research. (2025). Understanding Society. [data series]. 14th Release. UK Data Service. SN: 2000053, DOI: https://doi.org/10.5255/UKDA-Series-2000053.
.
Users must register with the UK Data Service before accessing the dataset.

Declarations

Conflict of interest No conflict of interest.

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