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ORIGINAL RESEARCH

Revisiting the Mental Health Impact of COVID-19 on Young Adults in the UK: Long-Term Trends, Temporary Setbacks, and Recovery

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Abstract
This study assesses the impact of the COVID-19 pandemic on the mental health of 16- to 29-year-olds in the United Kingdom, using longitudinal data from the UK Household Longitudinal Study (UKHLS) and its predecessor, covering the period from 2001 to 2023. The study identifies the causal effects of the lockdown (April 2020–March 2021) and the post-lockdown period (April 2021–March 2022) by estimating counterfactual mental health trajectories based on long-term trends. Unlike prior research, it accounts for potential reporting bias introduced by the UKHLS COVID-19 study. Mental ill-health among young adults had been rising for nearly two decades before the pandemic. During the lockdown period, the average General Health Questionnaire (GHQ-12) psychological distress score increased by 9% of its standard deviation, while the prevalence of clinically relevant psychological distress rose by 4.5% points. This impact was temporary, with mental health levels returning to predicted trends by April 2021, suggesting no lasting 'scar' on average mental health. The recovery coincided with declining feelings of loneliness and increased life satisfaction. The study also identifies variations in the pandemic's mental health effects by gender, household income, age, and ethnicity. Women and young adults in the top third of the household income distribution experienced a more pronounced increase in psychological distress during lockdown. However, there is no evidence that the under-30 age group suffered, on average, more severe mental health effects than the rest of the adult population under 60 during the lockdown period. The findings challenge prevalent narratives by demonstrating the relative resilience of young adults in the face of the pandemic.

Keywords Psychological distress · COVID-19 · Young adults · Longitudinal study · Survey design effects

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1 Introduction

This paper assesses the mental health of 16–29-year-olds in the United Kingdom between 2001 and 2023 before, during, and after the COVID-19 pandemic, focusing on the *causal effects* of the lockdown and post-lockdown period (Hernán, 2018). It analyses long-term trends in psychological distress and evaluates the pandemic's impact during the lockdown and post-lockdown period, accounting for differences in self-reported mental health across UK Household Longitudinal Study (UKHLS) surveys.

From the outset, there were concerns about the far-reaching mental health effects of COVID-19 (Hotopf et al., 2020). For example, Ahmed et al. (2023) counted 177 studies on pandemic-related mental health outcomes in Europe alone. While young people were less vulnerable to the disease's direct health risks, stringent containment measures disrupted their education, careers, leisure activities, and peer relationships, potentially affecting their developmental trajectories (Settersten et al., 2020). Numerous studies reported a pronounced deterioration in mental health during the pandemic's early phase in the UK (Fancourt et al., 2021), with young people and women disproportionately affected (Banks & Xu, 2020). However, research had to rely on convenience samples (O'Connor et al., 2021), did not adjust for pre-existing trends in mental health (Niedzwiedz et al., 2021), or did not consider how differences between surveys might have influenced self-reported mental health (Anaya et al., 2023; Pierce et al., 2020), potentially biasing estimates of pandemic-related impacts.

Indeed, longitudinal evidence outside the UK represents a less clear-cut picture of elevated mental health risks (e.g., Jaschke et al., 2023). More recent global reviews of high-quality longitudinal evidence suggest that mental health remained unchanged or worsened only minimally during the pandemic—even among adolescents and young adults (Sun et al., 2023). These findings contrast with narratives of a widespread and lasting decline in population well-being. Moreover, measurement issues have received relatively little attention, even though many UK-based studies rely on pre- and post-pandemic comparisons using different surveys.

Furthermore, evidence on mental health recovery following the vaccine rollouts, the lifting of lockdown restrictions, and economic rebounds remain limited. While receding stressors might be expected to improve young adults' psychological well-being, prolonged and repeated disruptions could have developed lasting 'scarring' effects on psychosocial development. Existing research presents mixed findings, reflecting context-specific mental health trajectories and differences in how well-being is conceptualised. For example, in the UK, Gagné et al. (2022) documented a sharp increase in the risk of psychological distress (GHQ-12) between 2018/19 and April 2020, followed by a decline between July and September 2020 in individuals aged 16–34. Similarly, Henseke et al. (2022) observed a substantial rise in life satisfaction between February 2021 and May 2022, linked to increased social interactions and reduced uncertainties about learning and careers. The vaccine rollout also improved mental health, particularly among clinically vulnerable groups (Chaudhuri & Howley, 2022). Feelings of loneliness had returned to pre-pandemic levels by September 2021 (Kung et al., 2023). In Norway, Kozák et al. (2023) report above-average scores of depressive symptoms among adolescents in 2021 but not in 2022, suggesting a recovery of mental health to long-term trends. In contrast, Neugebauer et al. (2023) reported persistent declines in life satisfaction in a sample of German high school students, and Dhensa-Kahlon

et al. (2025) found elevated psychological distress in UK adults aged 18–29 post-lockdown, though the extent to which these changes were pandemic-driven remains unclear.

This contrasting evidence underscores the importance of contextualising pandemic-related mental health trends within pre-existing dynamics. A growing body of research indicates that young people's mental health has been declining since at least the 2008 Great Recession (Blanchflower et al., 2024), as reflected in lower life satisfaction (Gagné et al., 2022), more reported symptoms of distress (Zhang et al., 2023), and rising self-harm (McManus et al., 2019). Irrespective of the causes, this ongoing deterioration suggests that distress levels in 2020 and beyond may have changed due to pre-pandemic trends rather than the pandemic itself. Additionally, psychological well-being tends to decline during the transition to adulthood (Blanchflower et al., 2024), explaining part of the mental health trends observed during the pandemic (Wright et al., 2024). Finally, small changes in survey design and administration can influence well-being estimates (Blanchflower, 2025; Conti & Pudney, 2011; Davillas et al., 2023), complicating longitudinal comparisons across studies.

Using longitudinal survey data from the UK Household Longitudinal Study (UKHLS, also known as Understanding Society), this study makes several key contributions. Firstly, we compare self-reported mental health between the UKHLS main survey and the COVID-19 study to evaluate whether questionnaire design influenced reported distress levels. Secondly, we track changes in psychological distress among 16–29-year-olds since 2001, adjusting for individual fixed effects (including cohort effects) and age-related life course changes (e.g., employment and household composition). Thirdly, we use a Neyman-Rubin causal approach to identify the Average Treatment Effect on the Treated of the COVID-19 pandemic, estimating individual-specific counterfactual levels of distress had 2020 and 2021 been 'normal' years, while accounting for differences between surveys.

This study aligns with prior UKHLS-based research on pandemic-related mental health impacts. Pierce et al. (2020) seminal contribution assessed the change in mental health in April 2020 against a counterfactual prediction of what would have been expected from population trends up to 2018/2019, finding a sharp increase in GHQ-12 distress among individuals under 35. However, their estimates did not account for age-specific mental health trends. Banks and Xu (2020) adjusted for these trends, confirming disproportionate mental health impacts on young adults and women. Gagné et al. (2021) showed that distress declined unevenly after April 2020, with slower recovery among women and young adults aged 25–34. More recently, Anaya et al. (2023) used a difference-in-differences approach, finding a + 32% standard deviation increase in GHQ-12 scores among 18–34-year-olds during the first national lockdown. Serrano-Alarcón et al. (2022) identified a reduction in mental ill-health from the easing of containment measures, pointing towards greater responsiveness of mental health to the behavioural restrictions than to the virus itself. Duarte Neves et al. (2024) also deployed a difference-in-difference approach, finding evidence for long-term 'scarring' of mental health from the pandemic for some population groups. All these studies combined data collected through a shortened web questionnaire launched in April 2020 with the UKHLS main survey, assuming rather than assessing measurement equivalence in self-reported mental health problems between the surveys.

The remainder of the paper is structured as follows. The next section introduces the datasets, measures, and the analytical strategy. Section 3 presents and discusses the findings. The final section concludes.

2 Methods

2.1 Datasets

The analysis draws on combined survey data from the first 14 waves of the UK Household Longitudinal Study (UKHLS), waves 11–18 of its predecessor, the British Household Panel Study (BHPS), and all sweeps of the UKHLS COVID-19 web survey (2020–2021). All data files are available for research at https://doi.org/10.5255/UKDA-Series-2000053.

UKHLS is an ongoing panel survey of about 40,000 households in the United Kingdom, launched in 2009 as a continuation of the BHPS, which ran from 1991 to 2008 (Institute for Social and Economic Research, 2023). The most recent wave (Wave 14) includes 35,500 individuals, nearly 6,000 of whom are under 30 years old. Fieldwork for each wave spans three years, with samples continually issued during the first two years. For example, UKHLS Wave 1 ran from 2009 to 2011 and Wave 14 issued samples from 2021 to 2023[1], creating overlapping fieldwork periods in each calendar year. Adults aged 16 and over in sampled households are re-interviewed annually, including core members (initial sample members and their descendants) who move or form a new household.

The BHPS followed a similar panel study protocol but with notable differences. It was smaller in scale, with full UK-wide coverage starting in 2001/2002 (Wave 11). Fieldwork typically began in September and lasted until April the following year. The final BHPS wave (2008/2009) collected data from 14,400 individuals (3,200 under 30 years old) across 8,100 households. UKHLS continued the BHPS sample from Wave 2 onward.

Due to lockdown restrictions, the UKHLS main survey shifted to a web-first mode in mid-March 2020, with most responses collected online and a smaller proportion via telephone. Face-to-face fieldwork commenced in April 2022. However, even before the pandemic, 70% of panel members were already invited to complete the questionnaire web-first (Burton et al., 2020). This means that the transition away from in-person interviews in 2020 was an acceleration of an existing trend rather than an abrupt shift.

Starting in April 2020, UKHLS participants were invited to complete a 20-minute web survey on their experiences and reactions to the COVID-19 pandemic (Institute for Social and Economic Research, 2021b). The first four waves of the COVID-19 study were conducted monthly between April and July 2020, followed by bi-monthly surveys from September 2020 to March 2021 (waves 5–8). A final ninth wave was conducted in September 2021.

As with the main survey over this period, responses were collected predominantly online, with a minor telephone mode available in waves 2 and 6. In the under-30 age group, telephone responses accounted for 39 cases in total (0.3% of all COVID-19 study cases under 30), which we integrated into the web survey dataset and did not treat separately. Response rates to the COVID-19 study varied from 42% in wave 1 to 29% in waves 6 and 7 (Institute for Social and Economic Research, 2021a). The COVID-19 study is fully integrated with UKHLS, using shared panel IDs and including core demographic, life course, and mental health information.

We extracted mental health, demographics, and life course data for 16–29-year-olds across UKHLS and BHPS survey waves since 2001. After removing singleton observations,

[1] There were 167 interviews with the target age-group in 2024, which were assigned to their sampling year-month.

there were 120,987 person-year observations from 22,247 individuals to measure long-term changes in mental health from 2001 to 2022 in the age-group 16–29 years.

To assess the mental health effects of COVID-19, we restrict the sample to cases aged 16–29 years in the UKHLS waves 1–14 (2009–2023) and the COVID-19 study (2020–2021). We employ a complete-case analysis in the unbalanced panel, acknowledging that sample attrition and excluding respondents with missing data may introduce bias. The limitations of this approach and robustness checks assessing attrition bias will be discussed in subsequent sections, where we introduce an added-variable test to examine whether panel retention is systematically associated with mental health outcomes in our estimation model. In all, the COVID-19 sample consists of 96,564 person-wave observations from 18,027 individuals aged 16–29, with an average panel retention of 5.4 waves per respondent. Figure 1 shows the distribution of observations over calendar quarters (2020–2023) and their source. The COVID-19 web surveys contributed the bulk of cases over the pandemic, at 64% in 2020 and 43% in 2021, while UKHLS main survey data provided a consistent reference point for benchmarking changes in reported mental ill-health. To compare patterns with older age groups, some analyses will lift the age restriction to include cases up to age 59 years.

2.2 Measures

Mental health is assessed using the 12-item General Health Questionnaire (GHQ-12), a widely used, validated, and reliable instrument for measuring non-specific psychological distress in longitudinal samples (Lundin et al., 2016) and youth populations (Baksheev et al., 2011). The GHQ-12 has been administered in every wave of the UKHLS, its COVID-19 study and BHPS, ensuring consistent measurement over time. Moreover, prior research

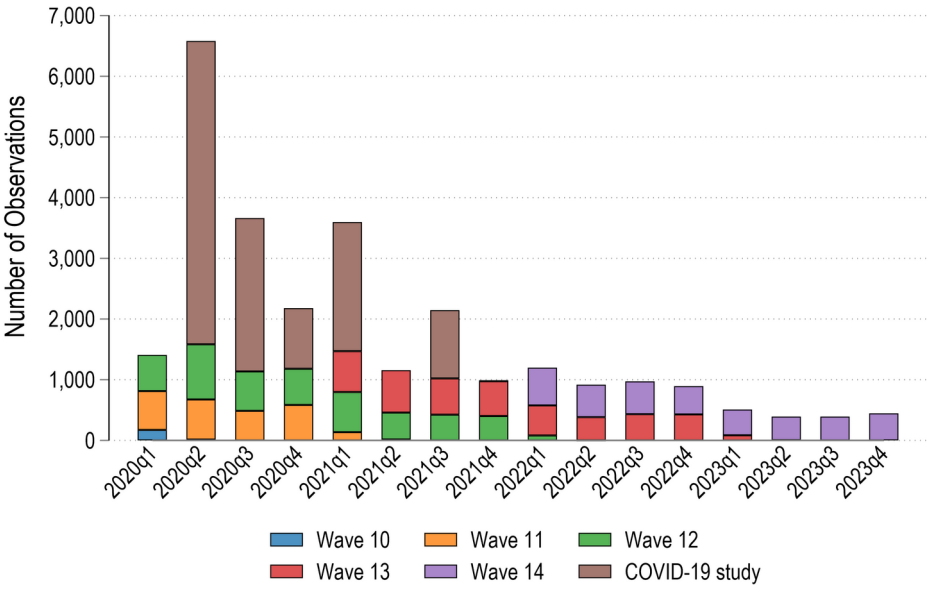

Fig. 1 Distribution of UKHLS Samples over Calendar Quarters, 2020–2023. Note: Count of cases in the UKHLS COVID-19 sample by data source over 2020–2023. Author's calculations

has found no evidence of panel conditioning effects in GHQ-12 responses (Pevalin, 2000), further supporting the instrument's consistency over repeated administrations.

For the analysis, two complementary measures of psychological distress are used, both derived from the same GHQ-12 instrument. The first is a continuous GHQ-12 score, constructed by summing responses across the twelve items, where each item is scored on a four-point Likert scale: 0 for "not at all," 1 for "no more than usual," 2 for "rather more than usual," and 3 for "much more than usual." The total GHQ-12 score ranges from 0 to 36, with higher values indicating greater psychological distress. The second measure is a binary indicator of psychological distress derived from the GHQ-12 instrument, identifying individuals experiencing clinically relevant distress if they reported "rather more than usual" or "much more than usual" on at least four of the twelve items. This cutpoint-based classification, commonly used in epidemiological and social science research (Pierce et al., 2020), helps to distinguish clinically relevant cases of psychological distress. Figure 2 shows the distribution of the GHQ-12 sum score in the trend sample, demonstrating that the measure effectively captures a broad range of distress levels. The distribution is right-skewed, with most observations concentrated in the lower-to-mid range but with a clear spread toward higher distress levels. Importantly, there is no apparent clustering near the upper end of the scale, confirming that the measure retains sensitivity at higher distress levels. This pattern suggests that ceiling effects are unlikely to be a major concern, as the GHQ-12 scale allows room for capturing worsening psychological distress if present.

In addition to mental health measures, for subgroup analyses and to control for life course milestones, we extract information on individual age, sex, ethnic minority status, employment status, partnership status, and the number of young children under five in the household. Socioeconomic status is measured using the percentile household income rank at the time individuals entered the panel, based on a comparison of gross monthly house-

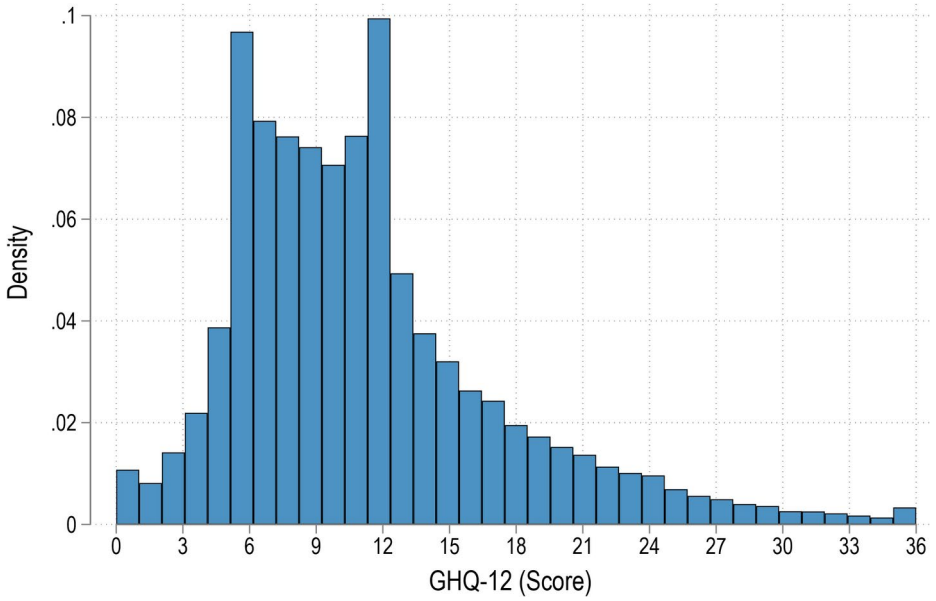

Fig. 2 Distribution of the GHQ-12 score in the Covid-19 Sample 2009–2023. Note: Pooled frequency distribution of the GHQ-12 scores in BHPS, UKHLS, and UKHLS Covid-19 study. Author's calculations

hold income equivalised for household composition using the modified OECD scale, ranked within each survey wave (Anyaegbu, 2010).

To measure time trends and survey effects, interview date information is incorporated to adjust for long-term changes and seasonal fluctuations in mental health outcomes. A binary indicator for the COVID-19 web study differentiates between the main survey and COVID-19 study observations.

Table 1 presents summary statistics for both the long-term trend sample (2001–2023) and the UKHLS sample (2009–2023). The two samples are highly comparable in terms of demographic composition and key characteristics. The mean GHQ-12 score was 11.4 in the trend sample and 11.6 in the UKHLS sample, with a similar proportion classified as psychologically distressed (23% vs. 24%). Both samples were skewed towards women (57% in the trend sample and 58% in the UKHLS sample), and about one-quarter of respondents identified as belonging to an ethnic minority group (24% vs. 27%). The distribution of age groups was stable across samples, with approximately 30% aged 16–19, 35% aged 20–24, and 35% aged 25–29. Socioeconomic factors also showed minimal differences; the mean household income rank was 49.41 in the trend sample and 48.20 in the UKHLS sample. Similarly, employment rates (54% vs. 53%) and partnership status (27% vs. 26%) were nearly identical.

Table 1 Summary statistics for samples of 16-29-year-olds

Variable	*N*	Individuals	Mean	Std. Dev	Std. Dev (within)
Long-Term Trend Sample 2001–2023					
GHQ-12 (Score)	120,987	22,247	11.41	5.95	4.17
GHQ-12 (Cases)	120,987	22,247	0.23	0.42	0.32
Female	120,984	22,246	0.57	0.50	0.00
Age: 16–19	120,987	22,247	0.30	0.46	0.33
Age: 20–24	120,987	22,247	0.35	0.48	0.40
Age: 25–29	120,987	22,247	0.35	0.48	0.33
Ethnic minority	119,012	21,777	0.24	0.42	0.00
Household income rank	119,632	21,973	49.41	27.84	0.00
In work	120,987	22,247	0.54	0.50	0.35
Living as a couple	120,987	22,247	0.27	0.45	0.24
Number of children < 5 in the household	120,987	22,247	0.18	0.46	0.27
UKHLS Sample 2009–2023					
GHQ-12 (Score)	96,564	18,027	11.64	6.03	4.20
GHQ-12 (Cases)	96,564	18,027	0.24	0.42	0.33
Female	96,561	18,026	0.58	0.49	0.00
Age: 16–19	96,564	18,027	0.30	0.46	0.32
Age: 20–24	96,564	18,027	0.36	0.48	0.40
Age: 25–29	96,564	18,027	0.35	0.48	0.32
Ethnic minority	95,044	17,659	0.27	0.44	0.00
Household income rank	95,222	17,757	48.20	27.68	0.00
In work	96,564	18,027	0.53	0.50	0.35
Living as a couple	96,564	18,027	0.26	0.44	0.23
Number of children < 5 in the household	96,564	18,027	0.17	0.45	0.25

Source: UKHLS and BHPS main surveys, UKHLS COVID-19 web surveys. Sample of 16-29-year-olds. Authors' calculations

2.3 Analytical Approach

Our analytical approach aims to estimate the causal impact of the COVID-19 pandemic on young adults' mental health by comparing observed outcomes during the pandemic with counterfactual outcomes predicted from pre-pandemic trends. We begin with a general model of individual mental health over time:

$$MH_{it} = \alpha_{it} + \gamma_t COVID(t) + \gamma_s COVID(s) + \varepsilon_{it}$$

Where:

- MH_{it} represents the mental health outcome (GHQ-12 scores or cases indicator) for individual i at time t.
- α_{it} is an individual-specific, time-dependent component that reflects life-course variation in predisposition towards mental (ill-)health.
- $\gamma_{t,s}$ captures the effect of the COVID-19 pandemic on mental health, distinguishing between the lockdown period (t = 1) and post-lockdown period (s = 1).
- ε_{it} represents idiosyncratic mental health shocks.

Our 'estimand' or target parameter is the Average Treatment Effect on the Treated (ATT) for the lockdown and post-lockdown periods (Lundberg et al., 2021). Specifically, for the lockdown period we define

$$ATT_t = E\left[MH_{it}^1 - MH_{it}^0 | COVID(t) = 1\right]$$

with an analogous definition for the post-lockdown period. This means the pandemic effect is conceptualised as the difference between the observed average mental health outcomes and the counterfactual scenario where the pandemic did not occur.

To estimate the ATT, we employ a linear fixed effects regression model that accounts for individual-specific time-invariant heterogeneity and flexible time trends. The model is specified as:

$$MH_{it} = \alpha_i + g(t) + X_{it}\beta + \delta_t D_{it} + \gamma_t COVID(t) + \gamma_s COVID(s) + \varepsilon_{it} \quad (1)$$

Where:

- α_i captures individual-specific fixed effects.
- g(t) is a function of time that captures period trends in mental health. Initially, we model g(t) as a cubic polynomial in survey years to capture long-term trends since 2009, following prior research (Banks & Xu, 2020; Pierce et al., 2020). We later test the robustness by replacing the cubic polynomial with a restricted cubic spline in interview dates.
- X_{it} is a vector of time-varying covariates, including age bands (<20, 20–24, 25+), partnership status, the number of children under 5 in the household, and survey month. These covariates serve as proxies for life-cycle markers, helping to approximate age-related effects and adjust for seasonal fluctuations in mental health.
- D_{it} time-varying survey design effects (dummy variable for COVID-19 surveys vs.

UKHLS main survey), accounting for potential level differences in self-reported mental health across surveys.

- $COVID(t,s)$ are indicator variables for the lockdown and post-lockdown periods, with the corresponding parameter $\gamma_{t,s}$ capturing the pandemic's effects on mental health.
- ε_{it} is the error term, assumed to be independent of the covariates, time trend and individual-fixed effects.

Under the assumption that our empirical model is correctly specified—meaning that individual fixed effects, time trends, and covariates fully capture the counterfactual mental health trajectory in the absence of the pandemic—the coefficients $\gamma_{t,s}$ in Eq. (1) represent the causal impact of the COVID-19 pandemic on mental health. Formally, we have

$$ATT_{t,s} = E\left[MH_i^1(t,s) - MH_i^0(t,s) \middle| COVID(t,s) = 1\right] = \gamma_{t,s}$$

which rests on the assumption that the counterfactual mental health —what would have occurred absent the pandemic—is fully captured by the pre-pandemic trends, individual fixed effects, and covariates: $\alpha_i + g(t) + \boldsymbol{X}_{it}\beta + \delta_t D_{it}$.

This approach relies on the *parallel trends assumption*, which posits that, in the absence of COVID-19, mental health outcomes during the pandemic would have followed the same underlying trajectory as in the pre-pandemic period. By incorporating individual fixed effects and a flexible time trend, our model effectively imposes this parallel trend assumption. Therefore, if this assumption holds, then any estimated deviations from the expected trajectory during the pandemic—captured by the COVID-19 period indicators—reflect the ATT.

To strengthen confidence in the parallel trends assumption and address potential threats to identification, we conduct several supplementary analyses and robustness checks:

1. *Covariate Adjustment*: While the model assumes that COVID-19's effects on mental health do not operate through life course markers, this assumption can be contested. We assess sensitivity by estimating the model without these covariates and comparing results.

2. *Event Study*: To examine the evolution of mental health changes over shorter intervals, we break the lockdown period into calendar quarters, allowing us to verify whether pre-pandemic trends closely mirror the dynamics observed during the pandemic in the absence of treatment.

3. *Subgroup Analysis*: We conducted subgroup analyses to examine whether the pandemic's effects varied across different demographic and socioeconomic groups. This helps illuminate the stability of our estimated effect, adding substantive insights as well.

4. *Alternative Measures of Subjective Well-Being*: We re-estimate models using alternative measures of subjective well-being (single-item life satisfaction and feelings of loneliness), testing whether findings are robust to different operationalisations of mental health and, thus, potentially different measurement errors.

5. *Attrition Bias Testing*: Given that panel dropout could be related to mental health, we explicitly test for attrition bias to ensure that selection effects do not confound estimates.

6. *Alternative Time Trend*: We replaced the cubic polynomial in survey years with a restricted cubic spline in interview dates to assess robustness against different specifications of the long-term time trend.

7. *Placebo Test*: Finally, we conducted a placebo test, assigning pseudo-treatment periods to years before the pandemic. The absence of significant effects in these placebo tests reinforces the credibility of our identification strategy.

Together, these checks address potential threats to identification and provide a framework for interpreting our estimates of the lockdown and post-lockdown effects as the causal impact of the COVID-19 pandemic and associated restrictions on mental health. Additionally, these analyses offer substantive insights into how young people coped with the pandemic and its immediate aftermath. While further discussion of life-cycle (age, period, and cohort) effects and the role of specific covariates is provided in the findings section, it is worth noting here that controlling for partnership status, the presence of young children, and broad age groups along with survey month adjustments, helps to separate period-specific effects from broader life-course dynamics.

All data cleaning, management, and analyses were conducted in Stata 18.5. Replication files are hosted at https://doi.org/10.5522/04/28469006.v1.

3 Findings

3.1 Differences in Psychological Distress Between the UKHLS Main Survey and the COVID-19 Study

Pooling observations from the UKHLS main survey and the COVID-19 study assumes that mental health measures are comparable across surveys. This assumption is based on the use of the same GHQ-12 instrument and the fact that both surveys were administered primarily via web questionnaires during the pandemic. However, if the questionnaire design introduced systematic measurement differences, pooling the two data sources without adjustment may introduce bias in longitudinal analyses of mental health before, during, and after the pandemic. To test for potential discrepancies, this section compares average levels of the GHQ-12 sum score and the prevalence of clinically relevant cases of psychological distress between the main survey and the COVID-19 study conducted in the same survey year-month.

Table 2 presents the results, comparing average differences in reported psychological distress between surveys in the age group 16–29 with figures for 30–44 and 45-59-year-

Table 2 Average differences in reported mental health problems between the UKHLS main survey and the COVID-19 study by age group ($N = 175{,}406$)

Age Group	GHQ-12 (Score)	GHQ-12 (Cases)
16–29	0.796***	0.021
	(0.173)	(0.012)
30–44	0.588***	0.021*
	(0.137)	(0.009)
45–59	0.072	-0.009
	(0.103)	(0.007)

Note: For each outcome, a survey-weighted regression was estimated with interactions among gender, age group, and COVID-19 study status, adjusting for the year and month of sample issuance. The average marginal effects of the COVID-19 study were computed by age group

Standard errors in parentheses. $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$

Source: UKHLS main waves 12 and 13, UKHLS COVID-19 study. Author's calculations

olds. The findings suggest statistically significant differences in reported mental health levels between the two surveys, particularly among younger adults. In the 16–29 age group, the COVID-19 study recorded higher distress levels than the main survey, with an average GHQ-12 score difference of 0.8 points (95% CI [0.46, 1.14]) and a 2.1% point increase in the prevalence of psychological distress (95% CI [-0.002, 0.044]), although the latter was not statistically significant at conventional levels.

For individuals aged 30–44, the COVID-19 study also reported higher distress levels, with an average GHQ-12 score difference of 0.59 points (95% CI [0.32, 0.86]) and a 2.1% point increase in the prevalence of psychological distress ($p < 0.05$). In contrast, there is no statistical evidence for survey effects on GHQ-12 scores among respondents aged 45 and above.

These findings suggest that reported levels of psychological distress differ between the UKHLS main survey and the UKHLS COVID-19 study, with elevated distress among younger respondents and lower distress among older respondents in the COVID-19 study relative to the main survey. The observed differences could be driven by selection effects, survey design variations, or administrative differences. While these results do not imply that one survey provides a more accurate estimate of mental health, they underscore the importance of accounting for potential measurement differences. Failing to do so could lead to biased estimates when assessing changes in mental health before, during, and after the pandemic, particularly for younger age groups.

3.2 Long-Term Trends in Mental Health Since 2001

This section examines long-term trends in mental health among 16-29-year-olds from 2001 onward, based on linear fixed effects estimations of Eq. (1). At this stage, the focus is on the underlying time trend $g(t)$, which is modelled using year dummies. To isolate period trends from confounding life course effects, the model includes individual fixed effects, which adjust for cohort differences and three broad age groups (<20, 20–24, and 25+), effectively constraining age effects. This effectively transforms Eq. (1) into an age-period-cohort (APC) model (Fosse & Winship, 2019). Figure 3 displays the estimated change in psychological distress over time, adjusted for individual heterogeneity and life stage.

The estimates indicate a steady and substantial increase in psychological distress among young adults. Between 2001 and 2019, the GHQ-12 score increased by 2.9 score points within individuals on average (Fig. 3, left plot), a difference that is both statistically and quantitatively significant. This increase represents 49% of the pooled standard deviation of the GHQ-12 scale (95% CI [41.5%, 57.5%]).

A similar trend is observed in the proportion of clinically relevant cases of psychological distress (Fig. 3, right panel). Compared to 2001, its prevalence had risen by 8.9% points within individuals by 2019. In relative terms, young adults in 2019 were 39% more likely to meet the distress threshold compared to those in 2001 (95% CI: [18.5%, 59.3%]), an increase equivalent to approximately 1.1 million additional cases per year in the age group.

Both plots peaked in 2020, followed by improvements, especially in cases of psychological distress. The following section will delve deeper into these patterns to unpick what changes were due to COVID-19 and the result of pre-existing trends.

For context, the trend towards mental ill-health, with a subsequent flatting in the wake of the COVID-19 pandemic, correlated with averages in prescribed medication in men-

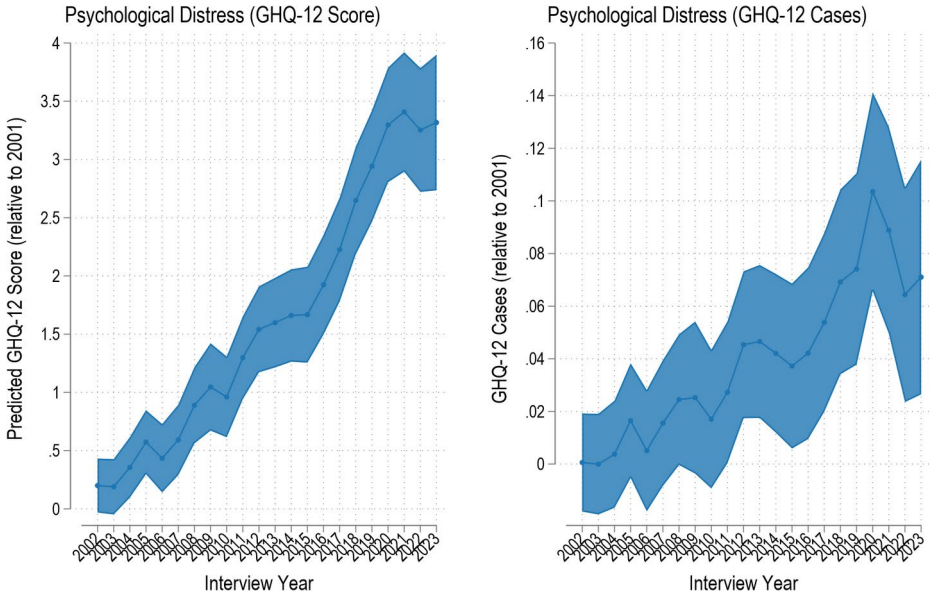

Fig. 3 *Long-term Changes in Psychological Distress, 2001–2023.* Note: Time trend in GHQ-12 scores and cases of psychological distress estimated using Eq. (1), incorporating individual fixed effects, year dummies, and age group controls. Dummy variables for the COVID-19 study interacted with the 2021-year dummy are included. The shaded areas represent 95% CI. $N = 120{,}987$ ($n = 22{,}247$).
Sources: BHPS, UKHLS Mainstage, and COVID-19 study. Authors' calculations

tal health per 15–29-year-old per year in England since 2016 (GHQ-12 Score: $r = 0.96$, $p < 0.001$; GHQ-12 Cases: $r = 0.79$, $p = 0.020$). The long-term increase in psychological distress among young adults highlights the need to assess potential pandemic effects conditional on changes that might have happened irrespective of the pandemic. Ignoring the long-term trends towards mental ill-health can upward bias or overstate the estimated impact of the COVID-19 shock on mental health and understate the subsequent recovery.

3.3 COVID-19 Impact: Deterioration and Recovery

Table 3 presents the estimated impact of the COVID-19 pandemic on psychological distress, based on Eq. (1). Column (1) provides estimates from a baseline model that adjusts for time trends but does not account for survey differences between the UKHLS main survey and the COVID-19 study. Column (2) presents the headline findings, incorporating covariates to adjust for survey design effects. Column (3) restricts the analysis to UKHLS main survey data, allowing for an assessment of how well the dummy variable adjustment strategy accounts for survey differences. Column (4) examines the sensitivity of the headline results by excluding life-course markers from the model. The top panel of Table 3 reports results for the GHQ-12 score, while the bottom panel presents findings for GHQ-12 cases with clinically relevant levels of psychological distress.

Column (1) estimates a 0.95-point increase in the GHQ-12 mean score and a 6%-point increase in clinically relevant cases of psychological distress during the lockdown period relative to the expected trend. Levels of psychological distress returned to trend in the

Table 3 Mental health during and after the COVID-19 pandemic

	(1)	(2)	(3)	(4)
	Trend adjusted	+ Design adjusted	Mainstage Only	W/o Covariates
GHQ-12 Score				
Lockdown	0.951***	0.538***	0.541***	0.540***
	(0.075)	(0.080)	(0.080)	(0.080)
Post-Lockdown	0.030	-0.150	-0.139	-0.150
	(0.087)	(0.090)	(0.091)	(0.090)
Difference	-0.921***	-0.688***	-0.680***	-0.690***
	(0.089)	(0.099)	(0.100)	(0.099)
GHQ-12 Cases				
Lockdown	0.060***	0.045***	0.046***	0.045***
	(0.006)	(0.006)	(0.006)	(0.006)
Post-Lockdown	-0.006	-0.013	-0.012	-0.013
	(0.007)	(0.007)	(0.007)	(0.007)
Difference	-0.067***	-0.058***	-0.058***	-0.058***
	(0.007)	(0.008)	(0.008)	(0.008)
Seasonally adjusted	X	X	X	X
Life course controls	X	X	X	
Design		X	X	X
Time trend	X	X	X	X
Observations	96,564	96,564	84,745	96,564
Individuals	18,027	18,027	17,985	18,027

Note: Results from linear fixed effects regression models estimating Eq. (1) for GHQ-12 scores and GHQ-12 cases. All models control for individual fixed effects, interview month, and a cubic polynomial in survey years since 2009. Column (2) adjusts for survey design effects using dummy variables for the COVID-19 study, interacted with interview year-quarter dummies. Column (3) restricts the sample to UKHLS main survey data. Column (4) excludes life-course markers (employment, partnership status, number of children under five)

Standard errors in parentheses. $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$

Source: UKHLS, UKHLS COVID-19 survey. Authors' calculations

post-lockdown period. However, these estimates do not account for potential survey mode effects. Column (2) presents the headline findings, which incorporate adjustments for survey differences. The estimates represent the difference between observed mental ill-health and the counterfactual level of mental ill-health had pre-pandemic trends continued and in the absence of survey response effects. The GHQ-12 mean score was 0.54 points higher than expected during the lockdown, while post-lockdown levels were 0.15 points below expected trends, although this difference was not statistically significant.

The increase in GHQ-12 scores during the lockdown period, while statistically significant, was quantitatively modest, amounting to 9.2% of the score's standard deviation (95% CI: [6.5%, 11.8%]). Similarly, the prevalence of clinically relevant psychological distress was 4.5% points above expected levels in the lockdown phase, implying that young adults were 19% more likely to meet the distress threshold (95% CI: [13.9%, 24.6%]). After March 2021, psychological distress recovered to expected levels, consistent with a return to the long-term trend. Taken together, these findings indicate that the direct impact of the COVID-19 pandemic on psychological distress was moderate and time-limited for the average 16-29-year-old with no apparent scarring of mental health from repeated lockdowns. The initial shock was followed by a recovery to trend levels.

Column (3) removes observations from the COVID-19 study, leaving only UKHLS main survey data. The similarity between columns (2) and (3) suggests that the dummy variable adjustment approach was sufficient to adjust for survey response effects on mental health reporting. Column (4) removes life-course markers from the model, with minimal impact on the headline findings. This suggests that the pandemic effect did not operate through partnership and family formation.

Once long-term trends and survey response effects are accounted for, the findings suggest that the mental health impact of the COVID-19 shock among young adults was limited in duration, with levels returning to expected trends after March 2021. Despite the substantial disruptions experienced during the pandemic, these findings indicate that, on average, young adults did not experience lasting scarring effects. However, this temporary setback and subsequent recovery must be understood within the broader context of a sustained long-term rise in psychological distress, which preceded the pandemic.

3.4 Calendar Quarter Changes in Psychological Distress

The broadly defined lockdown and post-lockdown periods may have smoothed out short-term shifts in psychological distress during the pandemic. To capture these variations, this section re-estimates Eq. (1) using the preferred specification from Column (2) of Table 3, detailing changes in mental health by calendar quarter from the first quarter of 2020 (2020Q1) to the fourth quarter of 2021 (2021Q4), when the COVID-19 survey provided an expanded sample. Figure 4 presents these results, illustrating quarterly changes in GHQ-12 scores and the prevalence of psychological distress relative to their counterfactual trends.

The GHQ-12 score was 0.43 points (95% CI: 0.17; 0.69), and cases of psychological distress were 5.4% points (95% CI: 3.2; 7.6) above-trend in 2020Q2, during the first UK lockdown. In relative terms, clinically relevant cases of psychological distress exceeded their counterfactual prediction by 14.7%, while the GHQ-12 rose + 7.3% standard deviations. A slight decline in psychological distress followed before another rise over the winter of 2020/2021, coinciding with renewed lockdown measures. The pandemic effect on GHQ-12 scores peaked in 2021Q1 with 0.9 score points above the counterfactual estimate, while the prevalence of GHQ-12 cases was comparable to its level during the initial pandemic shock.

Mental health indicators improved after 2021Q1. By the second quarter of 2021 (2021Q2), reported distress levels were statistically indistinguishable from the counterfactual trend. This suggests that the direct effect of the COVID-19 pandemic on psychological distress was concentrated in the periods of stringent lockdown measures. The full return of psychological distress levels to the predicted counterfactual trend also supports the parallel trends assumption. This finding suggests that, in the absence of the COVID-19 shock, mental health outcomes would have continued along their pre-pandemic trajectory, reinforcing the credibility of the identification strategy.

The results confirm that the impact of the pandemic on young adults' mental health was most pronounced in periods of widespread restrictions, with no evidence of persistent mental health deterioration at the population level beyond that point. These results are consistent with the broader trend analysis, which indicates that the rise in psychological distress associated with COVID-19 was temporary and that distress levels returned to their pre-pandemic trajectory once restrictions were permanently lifted, starting in 2021Q2.

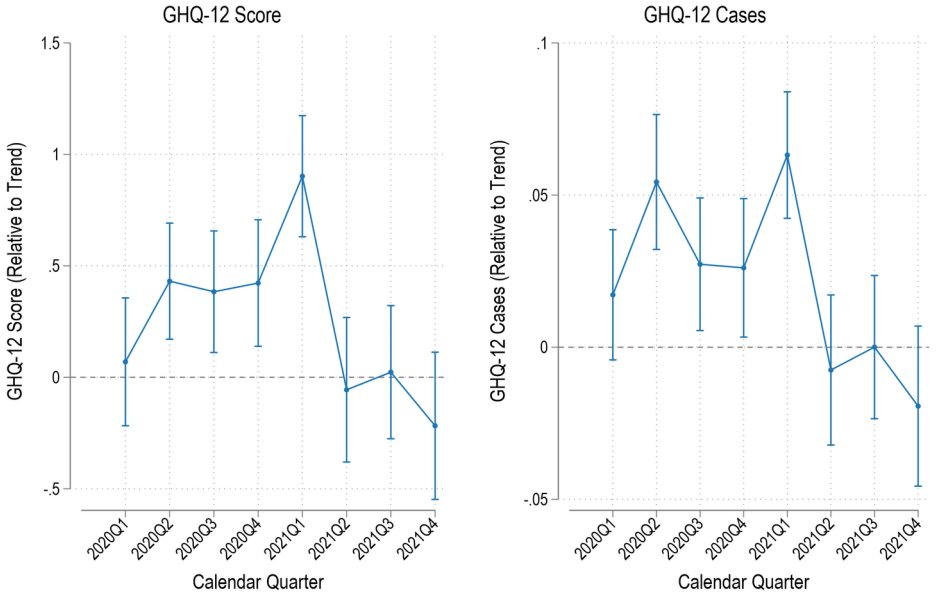

Fig. 4 *The Evolution of Young Adults' Mental Health by Calendar Quarter, 2020–2021.* Note: Charts depict the average marginal effect of quarterly dummies from linear fixed-effects regressions of Eq. (1) of the GHQ-12 score and psychological distress indicator with adjustments for pre-existing trends, life course, seasonal variations, and survey dummies interacted with interview year-quarter dummies in the COVID-19 sample of 16–29-year-olds. $N = 96{,}564$ ($n = 18{,}027$). 95% CI included.
Source: UKHLS, UKHLS COVID-19 survey. Authors' calculations.

3.5 Heterogeneous Effects

The mental health impact of the COVID-19 pandemic may have varied across demographic and socioeconomic groups due to, for example, differences in resources, behaviour, typical activities, or the level of disruptions.

However, re-estimating Eq. (1), including adjustments for survey response effects and time trends in pooled panel samples of 16–59-year-olds, does not suggest notable differences in the mental health response by age over the lockdown and post-lockdown period, as depicted in Fig. 5. On average across age groups, GHQ-12 was 0.46 points (95% CI [0.36; 0.56]) higher than expected during the acute phase and −0.11 score points (95% CI [−0.21; −0.004]) below trend in the recovery phase. Similarly, clinically relevant cases of psychological distress were 4.0% points (95% CI: 3.2; 4.8) above their counterfactual prediction in the acute phase and indistinguishable from trend thereafter (-0.005, 95% CI: −0.013; 0.003). Wald tests fail to reject the null hypotheses of age-homogenous mental health responses in response to the lockdown and post-lockdown periods across age groups (GHQ-12 score, $p = 0.757$; GHQ-12 cases, $p = 0.147$).

Within the sample of young adults, we also tested for differences in COVID-19 effects across gender (male/ female), age (16–21, 22–29), ethnicity (white/ ethnic minorities), baseline household income rank (bottom two-thirds, top third), and economic activity (not in work/ in work). The results indicate some variation in the extent to which different sub-

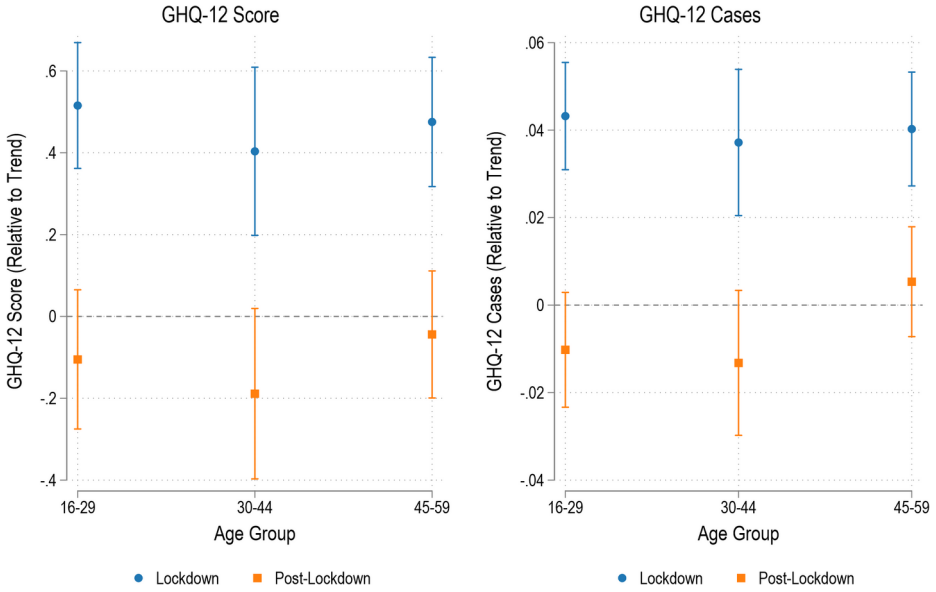

Fig. 5 *Lockdown and Post-Lockdown Effects on the GHQ-12 Score and GHQ-12 Cases by Age.* Note: Charts depict the average marginal effect for the lockdown and post-lockdown dummy variables from linear fixed-effects regressions of Eq. (1) of the GHQ-12 score and GHQ-12 cases indicator with adjustments for pre-existing trends, life course, time trend, seasonal variations, and a survey dummy interacted with the interview year-quarter dummies in samples of 16–59-year-olds ($N = 397{,}349$). Fully interacted with age-group indicators. The figure includes 95% CI.
Source: UKHLS, UKHLS COVID-19 survey. Authors' calculations

groups experienced distress during the lockdown period of the pandemic (see Tables A1 and A2 in the supplement).

For GHQ-12 scores, we note a significantly higher psychological distress effect of the lockdown period on young women and respondents in the top third of the household income distribution than the rest. In contrast, young people in work and ethnic minorities experienced a lower effect of the lockdown period on psychological distress than their counterparts (see Table A1 in the supplement); although in the case of ethnic minority groups, the difference did not reach the 5% level of significance. All subgroups' GHQ-12 sum scores were statistically indistinguishable from their counterfactual trend post-lockdown. Findings for GHQ-12 cases confirm patterns of heterogeneity by gender (women were hit harder) and ethnic minority, but not by economic activity (Table A2 in the supplement).

3.6 Additional Analyses and Robustness Checks

We assessed COVID-19's effect on life satisfaction and reported loneliness using Eq. (1), finding minimally higher-than-expected life satisfaction and lower-than-expected loneliness during the post-lockdown period. There is no evidence that either was adversely affected by the COVID-19 pandemic during lockdown (Table A3 in the supplement reports). The estimates confirm the improvements in psychological well-being with receding feelings of loneliness post-lockdown.

Table 4 Added variable test for panel retention

	GHQ-12 scores	GHQ-12 cases
Next-wave retention	F(1, 14015)=0.01, p=0.930	F(1,14015)=0.01, p=0.907
Previous-wave retention	F(1, 14015)=0.13, p=0.721	F(1,14015)=0.17, p=0.679

Note: F test results from variables measuring next-wave / previous-wave retention added to Eq. (1)

Source: UKHLS, UKHLS COVID-19 Study. Author's calculations

It is conceivable that the relatively small mental health effects are due to individuals in distress selecting out of the study. Like any panel study, UKHLS suffers from attrition over time. If this is the case, we might underestimate the impact of COVID-19 on mental ill-health. Therefore, we added indicator variables measuring next-wave retention– a respondent participated in the following wave and previous-wave retention– a respondent had participated in the previous wave– in turn to Eq. (1). These tests were conducted using both continuous psychological distress scores (GHQ-12 score) and clinically relevant cases of distress (GHQ-12 cases). The results for all tests were statistically insignificant (Table 4), meaning that panel retention did not predict psychological distress. These results do not suggest that panel retention was systematically related to mental health status.

Our identification of COVID-19-related mental health consequences relies on an appropriately fitted time trend, which can be difficult, especially towards the endpoints where data is sparse. To assess the robustness of the findings against an alternative specification, we re-estimated Eq. (1) with a restricted cubic spline in the interview date with five knots. Spline functions are piecewise-defined polynomials that are combined in such a way that they are smooth at the points where the pieces join, called knots. They are used in regression analysis to model nonlinear relationships between variables (Perperoglou et al., 2019). A restricted cubic spline is linear before the first knot and after the last knot, which can help extrapolation. The estimates suggest 0.50 points ($p<0.001$) higher than expected GHQ-12 score on average during the lockdown phase and a score of -0.14 ($p=0.125$) statistically indistinct from trend after that. The prevalence of clinically relevant psychological distress was raised by 4.3% points ($p<0.001$) compared to the counterfactual prediction in the lockdown period and statistically indistinct from its trend value afterwards (-0.013, $p=0.07$), confirming the modest and time-limited effect of the pandemic on young people's mental health as measured by the GHQ-12 instrument.

Finally, to ascertain how well the approach is able to separate out shocks from trends, we conducted a placebo test whereby we 'switched on' dummies for the more 'normal' years 2017 (Grenfell Tower Fire, Corbyn's defeat in the General Election, and #MeToo UK) and 2018 (Windrush scandal, royal wedding between Harry and Meghan, and arrival of TikTok), instead of the lockdown and post-lockdown dummy. The results for pseudo-treatments were statistically insignificant at common levels (Table A4), supporting the validity of the parallel trends assumption.

4 Discussion and Conclusion

4.1 Discussion

This study examines COVID-19's short and long-term mental health impact on 16-29-year-olds in the United Kingdom against longer-term trends, drawing on nationally representative longitudinal data from 2001 to 2023. The data enables a focus on pre-existing trends and experiences during and after the COVID-19 pandemic, controlling for variations in mental health over the life course and potential survey response effects between different survey sources during the pandemic. The findings suggest that already before the COVID-19 pandemic, there had been a rise in mental distress among young people. COVID-19 temporarily accelerated this trend towards mental ill-health, followed by a recovery, with no adverse long-term pandemic-related impacts observed on average, consistent with receding feelings of loneliness and above-trend life satisfaction post-lockdowns. The results apply after adjusting for time-constant individual differences, composition, a non-linear time trend, seasonality, and survey response effects between the UKHLS main and COVID-19 surveys employing linear fixed effects regression models.

The study provides much-needed evidence on the longer-term mental health trends among young adults in times of global upheavals. The increased levels of mental distress during the acute phase of the pandemic accelerated pre-existing trends, marked by the 2008 Great Recession, the subsequent UK government austerity programme, and an initial shock reaction in 2020 to the COVID-19 pandemic and lockdown measures, which then subsided after March 2021. Future research has yet to unpack the underlying changes driving the deterioration in young adults' mental health, which may include increases in social media use (Blanchflower et al., 2024), declining career outlooks, reduced real income, as well as new living arrangements with parents, partners, and others (Gagné et al., 2022), but also cuts to government spending for transport and youth services (Brown et al., 2024).

Focusing on experiences from 2020 to 2022, the findings support other studies that show that UK young adults experienced historically high levels of distress during the first national lockdown between April and July 2020. However, the findings suggest the initial mental health shock was (i) smaller than often reported and (ii) temporary after adjusting for pre-existing trends and different response patterns between data sources. The pandemic impact on mental health was stronger among women and young adults in the top third of the household income distribution and less impactful for ethnic minorities, echoing findings by Miall et al. (2023) for children in the UK. There was no evidence for a stronger pandemic-related mental health decline among young than older adults above 30 years. Similarly, we find no adverse long-term consequences of the pandemic on life satisfaction and reported loneliness on average. The moderate, temporary COVID-19-related setback in mental health is consistent with findings for youths in Norway (Kozák et al., 2023) or European adults, more generally (Blanchflower & Bryson, 2024). Heterogeneity in the mental health response within young adults during the COVID-19 pandemic might be due to differences in usual social interactions, spare time activities, participation in education and/or employment, or familiarity with stress and uncertainty. However, post-lockdown, average levels of psychological distress were back to their counterfactual trend.

The results highlight that, on average, young adults have had the capacity to adapt to the upheaval of the COVID-19 pandemic. However, some adverse COVID-related expe-

riences may continue to predict mental health problems beyond the short and medium term, underscoring the importance of considering individual-specific experiences (Anders & Holt-White, 2024). Furthermore, the analysis highlights the magnitude of the mental health burden already present in the UK's young adult population in the years leading up to 2020. Evidence of resilience during the pandemic suggests that while immediate support and interventions during the lockdown phases of crises were critical, long-term policies should focus on addressing the underlying deterioration in mental health among young adults. Strengthening mental health services and support systems and addressing the root causes to tackle the long-term rise in mental health problems is crucial for improving overall well-being and functioning.

4.2 Strengths and Limitations

The study combines nationally representative longitudinal data, including a validated measure of mental health, with a plausible strategy to estimate the causal effects of the COVID-19 pandemic in the short and long term. However, despite its strengths, there are a few possible limitations. First, while the observed trend compares well with patterns in prescriptions for medicines used in mental health, self-reported measures of psychological distress may introduce reporting biases. Second, the estimation of long-term mental health trends relies on a stepwise, coarsened specification of age to remain identifiable. This simplification could introduce bias. Third, while the study adjusts for pre-pandemic trends, life stages, and individual fixed and survey response effects, other unobserved factors could influence mental health outcomes. Fourth, while there is no immediate evidence for violation of the parallel trends assumption that informs the interpretation of the mode parameters as ATT, any unaccounted deviation from the counterfactual trend that happened at the same time as the country entered the lockdown and post-lockdown phase might introduce bias. However, factors such as anticipation effects, seem unlikely and are not borne out in the data (Fig. 4). Fifth, the study does not disentangle the direct effect of the pandemic (e.g., mortality and morbidity risks) from indirect effects stemming from containment policies. Finally, attrition across UKHLS has been high among young adults, and the COVID-19 survey waves had relatively low response rates and small young adult samples, introducing selection bias and the threat of underpowered subgroup comparisons. The sensitivity tests, including checks for panel attrition, support the robustness of the findings but cannot entirely eliminate these limitations.

5 Conclusion

Despite these limitations, this study offers unique evidence of trends in mental distress among young people in the UK over the past twenty-one years, including before, during and after the COVID-19 pandemic. Rising mental health problems among youth were already observed before the pandemic. We highlighted the increase in distress that young people have faced over time. Going back to trend levels of mental health should, therefore, not suffice as a public health target. The findings emphasise the need for systemic efforts to address the mental health problems among young adults and efforts to promote their well-being in the long term. Relevant initiatives must consider that despite the recovery following the

COVID-19 pandemic, pockets of increased vulnerabilities might compound into potential scarring effects on future outcomes.

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Data Availability The data used in this study are available from the UK Data Service (study numbers 6614 and 8644).

Declarations

Ethical Approval The University of Essex Ethics Committee granted ethical approval for data collection.

Conflict of Interest We declare no competing interests.

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