**How did the mental health of children and adolescents change during early lockdown during the
COVID-19 pandemic in the UK?**

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Abstract

Background

The COVID-19 pandemic has caused extensive disruption to the lives of children and young people. Understanding the psychological effects on children and young people, in the context of known risk factors, is crucial to mitigate the effects of the pandemic. This study set out to explore how mental health symptoms in children and adolescents changed over a month of full lockdown in the UK in response to the pandemic.

Methods

UK-based parents and carers (n = 2,673) of school-aged children and young people aged between 4 and 16 years completed an online survey about their child's mental health at two time points between March and May 2020, during early lockdown. The survey examined changes in emotional symptoms, conduct problems and hyperactivity/inattention.

Results

The findings highlighted particular deteriorations in mental health symptoms among pre-adolescent children, which translated to a 10% increase in those meeting possible/probable caseness criteria for emotional symptoms, a 20% increase in hyperactivity/inattention, and a 35% increase in conduct problems. In contrast, changes among adolescents were smaller (4% and 8% increase for hyperactivity/inattention and conduct problems respectively) with a small reduction in emotional symptoms (reflecting a 3% reduction in caseness). Overall, there were few differences in *change* in symptoms or caseness over time according to demographic characteristics, but children and young people in low income households and those with special educational needs and/or neurodevelopmental disorders, exhibited elevated symptoms (and caseness) at both time points.

Conclusions

The findings highlight important areas of concern in terms of the potential impact of lockdown on children and young people's adjustment. Developing an understanding of who has been most

severely affected by the pandemic, and in what ways, is crucial in order to target effective support where it is most needed.

Keywords

COVID-19, pandemic, lockdown, mental health, child, adolescent, youth

Introduction

While children and young people are at low risk of infection from COVID-19, the pandemic and the measures taken to try to minimise the spread of the virus, such as lockdown, school closures, and social distancing, have caused extensive disruption to the lives of children and young people. Understanding the psychological effects of the COVID-19 pandemic on children and young people, in the context of known risk factors, is crucial to mitigate the effects of the pandemic (Holmes et al., 2020).

Early cross-sectional findings have given an indication that children and young people have had relatively high levels of mental health symptoms during the pandemic (Racine et al., 2020). For example, in China, Xie et al. (2020) found that 22.6% of 2,330 young people surveyed reported elevated depressive symptoms and 18.9% reported elevated anxiety symptoms during lockdown. We have also recently started to see reports based on comparisons between children and young people's mental health prior to the pandemic and at a particular point of time during the pandemic. Of particular note, the NHS Digital survey of children and young people's mental health in England (NHS Digital, 2020) highlighted that in July 2020 (after the end of national lockdown but while many restrictions were still in place) the proportion of children and young people with a probable mental health disorder was 1 in 6, compared to 1 in 9 in 2017. While it is possible that this deterioration may have been a continuation of the pattern that had been seen from previous surveys, the fact that over 40% of young people reported that they felt that the pandemic had made their mental health worse highlights the potential contribution of the pandemic to this worsening picture. However, the lack of longitudinal data on change over time *during* the pandemic limits our understanding of how particular features of the pandemic, such as national lockdown (which included school closures for most children), were associated with changes in mental health.

It is likely that the impact of the pandemic will differ depending on a range of factors, including those already known to be risk factors for poor mental health generally. For children and young people, this includes being from a low income household (Gutman, Joshi, Parsonage, &

Schoon, 2015; Wickham, Whitehead, Taylor-Robinson, & Barr, 2017), a single parent household (partly due to material disadvantage) (Dunn et al., 1998; Spencer, 2005), and having Special Educational Needs (SEN) that require special health and education support (Gadeyne, Ghesquière, & Onghena, 2004; Linna et al., 1999). Indeed, there are already indications of a high prevalence of emotional and behavioural difficulties among young people with neurodevelopmental disorders during early lockdown (Nonweiler, Rattray, Baulcomb, Happé, & Absoud, 2020). In general, there are also differences in the risk of developing mental health difficulties on the basis of age and gender, with boys of primary school age more likely to have any mental disorder (12.2%; most commonly behavioural problems) than girls of the same age (6.6%), but by secondary school age, boys and girls are equally likely to have any mental disorder with higher rates of emotional disorders among adolescent girls (Davis et al., 2018). Finally, the impact of the pandemic may have differed between age groups. On the one hand, younger children may have faced particular disruption given that they are likely to be less able to access learning independently while out of school, are more dependent on their parents (who are known to have experienced high levels of stress during lockdown; Office for National Statistics, 2020), and less able to connect with peers in meaningful ways (e.g., remotely through electronic devices rather than face to face play) than adolescents, but on the other hand, adolescents might be particularly affected due to their normative drive for autonomy and social connections (Steinberg, 1990), which were curtailed during lockdown.

The Co-SPACE (Covid-19: Supporting parents, adolescents and children during epidemics) study was set up to track the trajectories of mental health of children and young people during the COVID-19 pandemic in the UK through a monthly online survey completed by parents and carers of children and young people aged 4 to 16 years. In this paper, we set out to answer the following research questions:

1. How did mental health of participating children and adolescents change during early lockdown in the UK- in terms of both continuous symptoms and 'caseness'?

2. How did this vary on the basis of (i) child gender, (ii) household income (living in poverty or not) and family composition (i.e., single adult family or not), and (iii) presence of special educational needs/neurodevelopmental disorders?

Method

Participants

Parents and carers (over the age of 18 years) of school-aged children and young people aged between 4 and 16 years who lived in the UK were eligible to take part. The current paper focuses on a subsample of 2,673 participants who completed the baseline survey online between the 30th March and the 30th April 2020 and a follow-up survey one month after baseline (30th April 2020 – 30th May 2020), and completed the Strengths and Difficulties Questionnaire (Goodman, 1997; Goodman, Meltzer, & Bailey, 1998) at both time points. Demographic information for participants and their children can be found in Table 1.

Procedure

Parents/carers provided informed consent and then completed the baseline survey online between the 30th March and the 29th April 2020 and a follow-up survey one month after baseline (30th April 2020 – 30th May 2020). If participants had more than one child within this age range, they were asked to choose one 'index' child to report on each time. A link to the follow up survey was sent via email to each parent/carer one calendar month after they had completed their baseline survey. Full procedural information can be found in the protocol (osf.io/8zx2y).

Measures

Demographics. Parents/carers reported on their own and their child's age, gender, and ethnicity and on their total household income. Due to the typical differences in patterns of child and adolescent mental health and their different educational experiences, we dichotomised age at baseline as 4-10 year olds (children) and 11-16 year olds (adolescents). A household income of less

than £16,000 per year was categorised as 'low household income' as it reflects an income below 60% of the median income in the UK. Parents/carers were asked whether or not their child had a special educational need and/or diagnosed attention deficit hyperactivity disorder (ADHD) or autism spectrum disorder (ASD). Parents/carers were also asked about their family composition (to establish whether there were any other adults aged 18 years or older living in the household).

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997; Goodman et al., 1998). The mental health of children and young people in the survey was measuring using the parent/carer-report version of the SDQ due to its satisfactory psychometric properties across the study age range (Stone, Otten, Engels, Vermulst, & Janssens, 2010). The SDQ consists of 25 items, each rated on a 3-point Likert scale ranging from 0 ("not at all") to 2 ("certainly true"). There are five subscales, each consisting of five items, assessing emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour. In the current paper, we examine the three sub-scales that relate to mental health symptoms: emotional symptoms, conduct problems and hyperactivity/inattention. A subscale score is obtained by summing the responses in each of the sub-scales (range 0-10). Where there was missing data, the person mean was imputed on responses to at least 3 of the 5 subscale items. The SDQ also includes an impact supplement which assesses impairment of the identified problems across 4 domains (the child's home life, friendships, school-life and leisure activities) and distress. Impact items are scored on a 4 point scale from 0 if either "not at all" or "only a little", 1 if "quite a lot" and 2 if "a great deal". Scores on the impairment and distress items are totalled, leading to a maximum total impact score of 10. As is a standard requirement for the SDQ, at the first assessment the SDQ asked about symptoms and impact over the last six months, and follow-up assessments asked about the preceding month.

The likelihood that a child or young person may have a mental disorder can be classified using a pseudo diagnostic algorithm as 'unlikely', 'possible' or 'probable', based on both symptom (>80th percentile= possible) and impact ('quite a lot' in at least one domain = possible) ratings

(Goodman, 1999; Goodman, Ford, Simmons, & Gatward, 2000). In this study we followed the 'lenient' approach (e.g. Nielsen et al., 2019), distinguishing between 'possible'/'probable' and 'unlikely' cases, to err on the side of being inclusive to those who might be a potential 'case'.

Data Analysis

All analyses were carried out in R Studio (v. 1.3.1093) using R (version 4.0.3). We calculated SDQ caseness categories using syntax downloaded from: <http://www.sdqinfo.com/py/sdqinfo/c0.py>. To examine change over time, the main effect of time point on SDQ symptoms was examined within separate linear mixed effects models for children and adolescents, and on SDQ caseness within binomial generalised mixed effects models (using a bobyqa optimizer, unless stated otherwise). We next repeated the models above, first with the inclusion of each variable of interest individually (where they were not already included in the models as covariates) and again with those variables as an interaction with time point, to establish how patterns of change in mental health symptoms varied on the basis of (i) child gender, (ii) household income (low (poverty level) income or not) and family composition (i.e., single adult family or not), (iii) presence of special educational needs/neurodevelopmental disorders (including ASD and ADHD). Models were run using the *lmer* function within the *lme4* package (v. 1.1-23; Bates, Mächler, Bolker, & Walker, 2015). Each model was estimated using maximum likelihood estimations (with laplace approximation for caseness models) and included dichotomous variables of child age, gender, and ethnicity and total household income and employment status as fixed effects. A random intercept was included for each participant and time was treated as a dichotomous variable with '0' representing baseline (baseline=0; follow-up=1).

Results

Question 1. How did mental health of participating children and adolescents change during early lockdown in the UK- in terms of both continuous symptoms and 'caseness'?

Table 2 presents the model results of the main effects of time for parent/carer reported emotional symptoms, conduct problems, and hyperactivity/inattention and caseness (means, percentages and confidence intervals can be found in supplementary materials tables S1 and S2).

Between baseline and follow-up, for children (age 4 to 10 years) there was a small increase in emotional symptoms and conduct problems and a larger increase in hyperactivity/inattention. For adolescents (age 11-16 years), emotional symptoms reduced over time, but there was little change in conduct problems, and a small increase in hyperactivity/inattention (see Figure 1).

Consistent with this pattern, for children, there were increases in caseness for emotional symptoms and hyperactivity/inattention; whereas the proportion of adolescents classified as a case did not change significantly for emotional symptoms, conduct problems, or hyperactivity/inattention (see Figure 1).

Question 2. How did this vary on the basis of child gender, household income, and family composition and presence of special educational needs/neurodevelopmental disorders?

Table 2 presents the model results of the main effects of predictor variables and their interaction effects with time for parent/carer reported emotional symptoms, conduct problems, and hyperactivity/inattention and for caseness. Figure 2 presents the change in time for each level of each predictor, split by age group. All means and confidence intervals for SDQ symptom scores, as well as percentages and percentage change for cases, can be found in supplementary materials 1 and 2, respectively.

(i) Child gender

Across time points, compared to boys, girls had higher emotional symptoms and lower hyperactivity/inattention symptoms and caseness among both children and adolescents. In children, girls also had lower levels of conduct problems than boys. However, among the children, girls

exhibited a greater increase in conduct scores over time than boys. For adolescents, there was a small increase among boys and a small reduction among girls. There were no significant interactions between time and gender for emotional symptoms or hyperactivity/inattention among children or adolescents. However, when caseness was considered, among children there was a significantly greater increase among girls than boys for possible/probable emotional, conduct and hyperactivity/inattention caseness. There were no significant interactions between gender and time for possible/probably caseness among adolescents.

(ii) Household income and family composition

Markedly elevated emotional and hyperactivity/inattention scores were found across time points for both children and adolescents in low income compared to high income families (and conduct for children), and this was also found for caseness for emotions and hyperactivity/inattention. However, changes in scores/caseness over time did not differ according to household income category.

Across time points, children living in single-adult households had elevated emotional and hyperactivity/inattention symptoms but did not differ from those in multiple adult households on conduct symptoms or caseness on the emotional, conduct, and hyperactivity/inattention subscales. Adolescents did not differ significantly on any of the three subscales on the basis of single/multiple adult household. However, for adolescents (but not children) there was a significant interaction between adults in the household and time for emotional symptoms, with a greater reduction in emotion symptoms found among for adolescents from a single adult household compared to adolescents from a multiple adult household, and for hyperactivity/inattention caseness, reflecting a 9.1% increase in caseness among multiple adult households and a 11.55% decrease in single adult households. A similar pattern was found for conduct problems caseness for children, with a greater

increase in caseness in multiple compared to single adult households. No other household status by time interactions were significant.

(iii) Child special educational needs/ neurodevelopmental disorders

Both children and adolescents with SEND/ND had markedly elevated emotion, conduct, and hyperactivity/inattention scores and caseness compared to those without SEND/ND across time points. For children and adolescents there was a significant interaction between SEND/ND and time, reflecting a very small decrease for those with SEND/ND for SDQ conduct (see figure 2 for symptoms and hyperactivity/inattention and a small increase in scores/caseness for those without SEND/ND. For children, a similar pattern was also found for emotional symptoms and caseness, where those with SEND/ND experienced a significant decrease and those without SEND/ND experienced a significant increase.

Discussion

This study set out to explore how common mental health symptoms in children and adolescents changed (on the basis of parent/carer report) over a month of full lockdown in the UK in response to the COVID-19 pandemic. The findings highlighted particular deteriorations in mental health symptoms among pre-adolescent children, which translated to a 10% increase in those meeting possible/probable caseness criteria for emotional symptoms, a 20% increase in hyperactivity/inattention, and a 35% increase in conduct problems. In contrast, changes among adolescents were smaller with a small reduction in emotional symptoms. Overall, there were few differences in change in symptoms or caseness over time according to demographic characteristics, with those at increased risk of mental health difficulties, such as those in low income households and those with SEN/ND, exhibiting elevated symptoms (and caseness) at both assessments. However, there were a few notable exceptions, in particular, among pre-adolescent children, there were greater increases in conduct symptoms and emotional, conduct, and hyperactivity/inattention

among girls than boys; whereas there were no differences in changes over time on the basis of gender among adolescents. Two notable groups where scores decreased over time were adolescents from single-parent households (in terms of emotional symptoms) and children and adolescents with SEN/ND (for conduct problems and hyperactivity/inattention).

Given the unprecedented context in which this study took place, it remains unclear why particular groups of children and young people experienced particular patterns of change in mental health symptoms and caseness. The finding that increases in mental health difficulties were most pronounced among primary school aged children may be surprising, given the known risk for the onset of mental health problems in adolescence (e.g., Kessler et al., 2005). However, on the other hand, increases in family stress caused by the demands of home-schooling alongside working (NHS Digital, 2020) may have been a particular challenge for parents of younger children who would have been more reliant on parents for support with education, as well as generally monitoring, entertaining and providing for them throughout the day. On the other hand, adolescents may have been relatively independent during lockdown, and were also likely to have been able to better maintain peer relationships through, for example, online chats, messaging, and gaming. The potential impact on both family stress and peer relationships on adjustment during lockdown will be a critical area for future research.

The increases in externalising (conduct, hyperactivity and inattention) problems across the age range are of particular concern, given the wide range of associated negative consequences for individuals, families, and societies (e.g. Erskine et al., 2016). It will be important to carefully monitor this over time to understand to what extent they reflect particular challenges associated with the early lockdown period, and whether they resolve once children and young people are able to return to (some of) their normal activities or persist and require further support. Notably, however, emotional symptoms somewhat declined among adolescents. The lack of pre-pandemic data and

day-to-day data right from the start of the pandemic makes this difficult to interpret, as it is possible that, for example, adolescents' levels of emotional symptoms had increased prior to the start of this study and we saw a gradual return to 'normal' levels. Alternatively, it is possible that aspects of lockdown brought some benefits to participating adolescents, particularly due to a reduction in academic or social pressures (which are both known to be high among adolescents; e.g., Peña-López, 2016). Whilst our findings are based on parent/carer report, at least one other study has reported a reduction in adolescent self-reported anxiety levels among year 9 (13-14 year olds) from pre to during pandemic assessments (Widnall, Winstone, Mars, Haworth, & Kidger, 2020). Notably we also saw particular reductions in emotional symptoms among adolescents from single-parent households and externalising problems among children and adolescents with SEN/ND. It is important to recognise that these groups had elevated mental health symptoms throughout, however it appears that, at least for some children and young people lockdown may have eased some challenging areas of life. These findings are consistent with others that have emerged during the pandemic that have highlighted particular groups of young people who have reported that their mental health benefited during lockdown (Mansfield, Jindra, & Fazel, 2020; Mind, 2020), for example, due to enjoying more time with family members (Levita, 2020) and having more opportunities to engage in valued activities (The Children's Society, 2020).

While we do not have pre-pandemic data so cannot comment on, for example, changes in the prevalence of mental health problems because of the pandemic, these findings do give an indication of how mental health changed for children and young people *within* the first pandemic-related lockdown in the UK. This has implications both for understanding the potential impact of such measures and for interpreting findings from other studies that have compared outcomes in pre-lockdown assessments to those collected at a particular point in time post-lockdown. It is also important to highlight that, in order to be able use comparable measures across the 4 to 16 year age range, we relied on parent or carer reported mental health symptoms. We are reassured by consistent patterns of findings with other studies that have examined adolescent self-reported

mental health symptoms (Widnall et al, 2020), however do need to acknowledge the possibility that parents/carers may not have been aware of the full extent of any, particularly emotional, symptoms (e.g., Salbach-Andrae, Lenz, & Lehmkuhl, 2009). Indeed, the elevation in externalising problems (e.g., arguments) seen across the age range may reflect broader distress observed in the form of behavioural disturbance (Angold & Costello, 1993).

It is also important to highlight that the study population was not a representative sample, and there was clear bias towards more affluent families from White British backgrounds. Given the markedly elevated levels of mental health symptoms and caseness found among children and young people in low income households within our study, we expect that the levels of difficulties we have reported here are likely an under-estimation of the extent of difficulties experienced more broadly in the community, and detection of predictors of change in mental health symptoms over time may have been limited by relatively small samples among some groups. Indeed, the very small samples within, for example, individual ethnic groups unfortunately meant that we were limited to combining children and adolescents from Black, Asian and ethnic minority backgrounds in to one category, which is a clear limitation given the very different experiences during the pandemic (Levita, 2020). Other factors such as the child and families' experience of Covid-19, parental employment status (including whether a keyworker, working out of the home and in relatively high risk environments), and child school attendance will also be important to consider in future investigations.

This rapid longitudinal study in response to the first COVID-19 lockdown in the UK has highlighted deterioration in parent reported externalising behaviours among participating children and, to a lesser extent, adolescents over one month of lockdown. While emotional symptoms also increased among preadolescents in this study, there was a small decrease among adolescents, and this was also the case for externalising problems among children and adolescents with special educational needs. As such the findings highlight important areas of concern in terms of the potential impact of the first national lockdown on children and young people's adjustment. It will be

important to further track the trajectories of mental health of children and young people over the course of the pandemic beyond early lockdown, as schools reopen, further regional and national lockdowns occur and the economic impacts are more keenly felt. Developing an understanding of who has been most severely affected by the pandemic, and in what ways, is crucial to target effective support where it is most needed.

Key points and relevance

- Early cross-sectional findings have given an indication that children and young people have had relatively high levels of mental health symptoms during the Covid-19 pandemic.
- Little is known about changes in children and young people's mental health *during* the national lockdown.
- The findings highlighted particular deteriorations in mental health symptoms over a month during early lockdown among pre-adolescent children.
- There were elevated symptoms at both time points (but little change over time) for children from low income households and those with special educational needs and/or neurodevelopmental disorders.
- Developing an understanding of who has been most severely affected by the pandemic, and in what ways, is crucial in order to target effective support where it is most needed.

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Table 1.*Sample Demographics*

	Children (4-10 years) n = 1,776 (66.44%)	Adolescent (11-16 years) n = 897 (33.56%)	Full sample n = 2,673
Parent gender			
Male	107 (6.03%)	43 (4.79%)	150 (5.61)
Female	1,664 (93.70%)	849 (94.65%)	2,513 (94.01)
Parent ethnicity			
White British	1,698 (95.61%)	871 (97.10%)	2,569 (96.11)
Other	78 (4.39%)	26 (2.90%)	92 (3.44%)
Parent/carer education			
School/vocational qualification	247 (13.91%)	145 (16.17%)	392 (14.67)
Undergraduate degree	702 (39.53%)	366 (40.80%)	1,068 (39.96)
Post-graduate degree	819 (46.12%)	376 (41.92%)	1,195 (44.71)
Child mean age (sd)	7.10 (1.90)	13.31 (1.67)	
Child gender			
Male	916 (51.58%)	466 (51.95%)	1,382 (51.70)
Female	853 (48.03%)	418 (46.60%)	1,271 (47.55)
Child ethnicity			
White British	1,631 (91.84%)	848 (94.54%)	2,479 (92.74)
Other	145 (8.16%)	49 (5.46%)	182 (6.81)
Household income			
< £16,000 p.a.	79 (4.45%)	61 (6.80%)	140 (5.24)
> £16,000 p.a.	1,588 (89.41%)	755 (84.17%)	2,343 (87.65)
Prefer not to say	109 (6.14%)	81 (9.03%)	190 (7.11)
Family composition			
Single adult household	206 (11.60%)	155 (17.28%)	361 (13.51)
Multiple adult household	1,570 (88.40%)	742 (82.72%)	2,312 (86.50)

SEND/ND = Special educational needs/neurodevelopmental disorders.

Table 2.

Model results from separate regression models estimating the main effects of time and other key predictors of parent/carer reported emotional, conduct and hyperactivity/inattention symptoms and problems, with significance values for their interaction with time point.

SDQ EMOTIONAL SYMPTOMS					SDQ CONDUCT PROBLEMS				SDQ HYPERACTIVITY/INATTENTION			
SDQ Symptom Models												
Symptoms/ problems	<i>b</i> (SE)/ OR (SE)	t-value/ z-value	95% CI	Time*predictor interaction	<i>b</i> (SE)/ OR (SE)	t-value/ z-value	95% CI	Time*predictor interaction	<i>b</i> (SE)/ OR (SE)	t-value/ z-value	95% CI	Time*predictor interaction
Children (aged 4-10 years)												
Time point ¹	0.14 (0.04)	3.23**	[0.05, 0.22]	-	0.30 (0.03)	9.62***	[0.24, 0.36]	-	0.61 (0.04)	13.86***	[0.52, 0.69]	-
Gender ¹	-0.24 (0.11)	-2.18*	[-0.46, -0.02]	<i>p</i> = 0.79	0.24 (0.08)	3.01**	[0.08, 0.40]	<i>p</i> = 0.03	0.97 (0.12)	8.13***	[0.73, 1.20]	<i>p</i> = 0.09
Income ¹	1.33 (0.27)	4.88***	[0.79, 1.86]	<i>p</i> = 0.68	0.87 (0.20)	4.43***	[0.48, 1.25]	<i>p</i> = 0.76	1.17 (0.29)	3.99***	[0.59, 1.74]	<i>p</i> = 0.76
Single Adult ²	0.69 (0.18)	3.74***	[0.33, 1.04]	<i>p</i> = 0.93	0.19 (0.13)	1.41	[-0.07, 0.45]	<i>p</i> = 0.28	0.52 (0.20)	2.61**	[0.13, 0.90]	<i>p</i> = 0.14
SEND/ND ³	2.21 (0.16)	14.04***	[1.90, 2.52]	<i>p</i> = 0.01	1.67 (0.11)	14.85***	[1.45, 1.89]	<i>p</i> < 0.001	2.97 (0.16)	18.14***	[2.65, 3.29]	<i>p</i> < 0.001
Adolescents (aged 11-16 years)												
Time point ⁴	-0.24 (0.06)	-4.04***	[-0.36, -0.13]	-	0.02 (0.04)	0.63	[-0.05, 0.10]	-	0.12 (0.06)	2.15*	[0.01, 0.24]	-
Gender ⁴	-0.76 (0.17)	-4.50***	[-1.10, -0.43]	<i>p</i> = 0.56	0.28 (0.12)	2.30*	[0.04, 0.51]	<i>p</i> = 0.04	1.15 (0.17)	6.75***	[0.82, 1.48]	<i>p</i> = 0.49
Income ⁴	1.19 (0.35)	3.42***	[0.51, 1.87]	<i>p</i> = 0.16	0.38 (0.25)	1.53	[-0.11, 0.86]	<i>p</i> = 0.69	0.97 (0.35)	2.79**	[0.29, 1.65]	<i>p</i> = 0.80
Single Adult ⁵	0.06 (0.25)	0.24	[-0.42, 0.54]	<i>p</i> = 0.02	0.11 (0.17)	0.65	[-0.23, 0.45]	<i>p</i> = 0.48	0.17 (0.25)	0.68	[-0.31, 0.65]	<i>p</i> = 0.51

Changes in child mental health during Covid-19 lockdown

SEND/ND ⁶	2.41 (0.19)	12.50***	[2.03, 2.79]	$p = 0.48$	1.40 (0.14)	10.06***	[1.13, 1.68]	$p = 0.004$	2.65 (0.19)	13.96***	[2.28, 3.02]	$p = 0.001$
SDQ Problems Models												
Children												
Time point ⁷	1.68 (0.32)	2.71**	[1.15, 2.46]	-	5.10 (1.05)	7.95***	[3.41, 7.63]	-	1.34 (0.20)	6.61***	[0.94, 1.74]	-
Gender ⁷	0.97 (0.33)	-0.08	[0.50, 1.91]	$p < 0.001$	1.49 (0.47)	1.27	[0.81, 2.76]	$p = 0.01$	0.81 (0.35)	2.34*	[0.13, 1.49]	$p < 0.001$
Income ⁷	8.08 (7.10)	2.38*	[1.44, 45.25]	$p = 0.92$	4.71 (3.84)	1.90	[0.95, 23.24]	$p = 0.53$	2.34 (1.19)	1.97	[0.01, 4.68]	$p = 0.23$
Single Adult ⁸	1.63 (0.88)	0.90	[0.56, 4.71]	$p = 0.45$	1.49 (0.75)	0.80	[0.56, 4.00]	$p < 0.001$	1.35 (0.78)	0.52	[0.44, 4.18]	$p = 0.27$
SEND/ND ^{9, ¥}	-	8.01***	-	$p < 0.001$	-	7.87***	-	$p < 0.001$	-	22.60***	-	$p < 0.001$
Adolescents												
Time point ¹⁰	0.76 (0.20)	-1.05	[0.45, 1.27]	-	0.53 (0.29)	1.82	[-0.04, 1.09]	-	1.40 (0.41)	1.16	[0.79, 2.49]	-
Gender ¹⁰	0.54 (0.27)	-1.24	[0.20, 1.44]	$p = 0.51$	0.45 (0.52)	0.87	[-0.57, 1.47]	$p = 0.12$	2.15 (1.20)	1.38	[0.72, 6.40]	$p = 0.99$
Income ¹⁰	7.14 (8.07)	1.74	[0.78, 65.36]	$p = 0.06$	0.09 (0.99)	0.09	[-1.85, 2.02]	$p = 0.55$	2.80 (2.81)	1.03	[0.39, 19.97]	$p = 0.19$
Single Adult ¹¹	1.00 (0.73)	-0.01	[0.24, 4.22]	$p = 0.68$	0.92 (0.69)	-0.12	[0.21, 3.99]	$p = 0.24$	1.20 (0.93)	0.24	[0.26, 5.47]	$p = 0.05$
SEND/ND ^{12, ¥}	-	5.60***	-	$p = 0.16$	-	3.58***	-	$p < 0.001$	-	14.41***	-	$p < 0.001$

SEND/ND = Special educational needs/neurodevelopmental disorders; SDQ = Strengths and Difficulties Questionnaire; Data for main effects taken from the same models

are denoted with the same number in superscript. All interaction p-values are from individual and separate models; ¥ Meaningful odds ratios for the main effect of

SEND/ND could not be calculated due to the significant overlap between caseness and SEND/ND; * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Figure 1.

Estimated marginal means and % caseness for SDQ emotional symptoms, conduct problems and hyperactivity/inattention from baseline to follow-up, by age group.

Figure 2.

Predicted means for SDQ emotional symptoms, conduct problems and hyperactivity/inattention from baseline to follow up, by age group and each moderator variable (with 95% CI error bars)