

Psychological effects of the COVID-19 lockdown on children and families in the UK

Evren Morgül¹, Angeliki Kallitsoglou², & Cecilia A. Essau¹

¹Department of Psychology, University of Roehampton, London, United Kingdom

²School of Education, University of Roehampton, London, United Kingdom

Abstract

The implementation of measures (e.g. school closure and social distancing) to contain the spread of COVID-19 by government in numerous countries has affected millions of children and their families worldwide. However, the consequences of such measures on children's wellbeing are not fully understood. The aim of the present study was to examine the psychological impact of the COVID-19 lockdown on primary school children and their families living in the UK. A total of 927 caregivers with children aged between 5 and 11 years completed an online survey which included a set of questionnaires to measure their own behaviour and emotional state as well as that of their children before and during the lockdown. Caregivers reported changes in their children's emotional state and behaviours during the lockdown. The most frequently reported child symptom was boredom (73.8%), followed by loneliness (64.5%) and frustration (61.4%). Irritability, restlessness, anger, anxiety, sadness, worry and being likely to argue with the rest of the family was reported by more than 30% of the caregivers. During the lockdown, children spent significantly more time using screens, and less time doing physical activity and sleeping. Moreover, family coexistence during the lockdown was described as moderately difficult. More than half of the caregivers reported being moderately or seriously distressed during the lockdown and caregiver level of psychological distress was significantly related to child symptoms. The findings emphasised the importance of developing prevention programmes to mitigate the impact of COVID-19 pandemic on children's and their family's psychological wellbeing.

Keywords: COVID-19; children; families; psychological impacts; lockdown.

Resumen

Efectos psicológicos del confinamiento por COVID-19 en niños y familias en el Reino Unido. La implementación de medidas para contener la propagación del COVID-19 por parte del gobierno en numerosos países (por ejemplo, el cierre de colegios y el distanciamiento social) ha afectado a millones de niños y a sus familias en todo el mundo. Sin embargo, se desconocen las consecuencias de esas medidas en el bienestar de los niños. El objetivo del presente estudio fue examinar el impacto psicológico del confinamiento por COVID-19 en niños de educación primaria y en sus familias, residentes en Reino Unido. Un total de 927 padres y madres de niños de 5 a 11 años completaron una batería online compuesta por un conjunto de cuestionarios para evaluar su propio comportamiento y su estado emocional, así como el de sus hijos, antes y durante el confinamiento. Los padres informaron de cambios en el estado emocional y en el comportamiento de sus hijos. El síntoma infantil más frecuente fue el aburrimiento (73.8%), seguido del sentimiento de soledad (64.5%) y la frustración (61.4%). Más del 30% de los padres informaron de irritabilidad, inquietud, enfado, ansiedad, tristeza, preocupación y de una mayor probabilidad de discutir con el resto de la familia. Durante el confinamiento, los niños pasaban significativamente más tiempo usando pantallas y menos tiempo realizando actividad física y durmiendo. Además, la convivencia familiar se describió como moderadamente difícil. Más de la mitad de los padres informaron de niveles moderados o graves de estrés durante el confinamiento, que se relacionó significativamente con los síntomas del niño. Los hallazgos enfatizan la importancia de desarrollar programas de prevención para mitigar el impacto de la pandemia de COVID-19 en el bienestar psicológico de los niños y sus familias.

Palabras clave: COVID-19; niños; familias; impacto psicológico; confinamiento.

In late 2019, the first cases of a novel pneumonia were reported in Wuhan, China and at the beginning of January 2020, the novel coronavirus was linked to the respiratory disease called COVID-19 (World Health Organization, 2020). The World Health Organization (WHO) declared it as a pandemic on 11th March 2020 due to its serious and

rapid spread (World Health Organization, 2020). Four months after its emergence, the virus had spread to many countries and officially infected over 25 million people and claiming over 865,644 lives on 2nd September 2020 (Worldometer Statistics, 2020). The United Kingdom (UK) has been one of the seriously affected countries worldwide, with

Corresponding author:

Angeliki Kallitsoglou

School of Education, Grove House

University of Roehampton, London, SW15 4HT, UK

E.mail: angeliki.kallitsoglou@roehampton.ac.uk

338,676 total reported cases on 2nd September 2020 since its spread (Worldometer Statistics, 2020).

The COVID-19 pandemic has altered the daily lives of the global population profoundly in a very short period. To contain the spread of the virus, many countries introduced serious social restrictions including lockdown (Frank & Grady, 2020). Quarantine-type measures include home confinement, banning public gatherings and commuting to work unless necessary, closing schools, universities and all non-essential businesses, and avoiding contact with out of household people. The long-term consequences of the lockdown on mental health is not fully understood, but an increasing body of research suggests that being in lockdown is associated with poor social and emotional wellbeing in adults (Brooks et al., 2020) and in children (Jiao et al., 2020; Orgilés, Morales, Delvecchio, Mazzeschi, & Espada, 2020). Additionally, home confinement has been found to impact children's wellbeing negatively because of unprecedented changes in lifestyle including limitations in physical activity and increases in domestic conflict (Wang, Zhang, Zhao, Zhang, & Jiang, 2020). In the UK, as in many countries, country-wide school closures were implemented, except for children of key workers, to stop the spread of the pandemic. School closures are speculated to have had serious psychosocial effects on children (Spinelli, Lionett, Pastore, & Fasolo, 2020; Holmes et al., 2020) because school is not only a place for children to learn, but also offers opportunities for interaction with friends and for psychological comfort (Sylva, 1994). Evidence suggests that when children are out of school (e.g. weekends or summer holidays), they are physically less active, have longer times of screen use, less healthy eating habits and unsteady sleep patterns (Brazendale et al., 2017; Wang, et al. 2019).

To date, only a few studies have investigated the impact of COVID-19 lockdown on children's and adolescents' mental health and daily habits. Orgilés and colleagues (2020) were among the first to have examined the impact of COVID-19 lockdown on children's mental health. Among children in Spain and Italy, they found that more than 85% of the parents reported changes in their children's emotional state and behaviours with increase in concentration difficulties being the most reported (76.6%). Besides the psychological effects of COVID-19 lockdown on children and adolescents, some studies reported increased rates of stress in parents. The perceived difficulty of the lockdown can influence parental stress which in turn can impact on children's psychological well-being (Dalton, Rapa, & Stein, 2020; Spinelli et al., 2020). For instance, Spinelli et al. (2020) found that parents who reported more difficulties in dealing with quarantine reported more stress which in turn, increased children's emotional and behavioural difficulties. Similarly, another study found an association between perceived difficulty of family coexistence during the quarantine, higher level of family stress, and parental reported emotional problems in children (Orgilés et al., 2020). A recent rapid systematic review showed that COVID-19 related loneliness in children was associated with subsequent mental health problems including depression (Loades et al., 2020).

In the UK, the lockdown started on 23rd March, 2020 (UK Government, 2020). To date, only a few studies have examined the psychological impacts of the lockdown on primary school children's behavioural and emotional well-being, lifestyle, and their association with parental mental health. Preliminary findings from the Co-SPACE study, a large multi-national longitudinal study that has been tracking the mental health of school-aged children and young people throughout the COVID-19 crisis, showed that parents/carers of 4-10 year olds in the UK reported significant increases on emo-

tional, behavioural, and restless/attentional difficulties as the lockdown progressed over a one-month period (Pearcey, Shum, Waite, Patalay, & Creswell, 2020). The findings also showed that parents have been stressed over work, child wellbeing, family and friends outside the home, child education and screen time (Waite & Creswell, 2020).

The present study examined perceived change in a wide range of specific childhood (5-11 years) behaviours, emotional state and daily activities before and during the lockdown and the association of these changes with parental mental health in a large sample of parents/carers living in the UK.

Method

Participants

Data used for the present analyses came from 927 caregivers (mothers $n = 898$, 96.9%; fathers $n = 17$, 1.8%; and other caregivers $n = 7$, 8%). They ranged in age from 21-61 years (mean age $M_{age} = 39.3$ years, $SD = 5.5$) with nearly half of them (48.3%) between the ages of 30-39 years. As shown in Table 1, most were primarily of White ethnic background (92.1%) with approximately two thirds (69.6%) of White British background. Additionally, most participants were married (74.3%), in employment ($n=673$, 73.6%) and had completed a higher education degree and/or postgraduate studies ($n = 687$, 75.0%). Mothers were more likely than fathers to work part time (29.8%) and have higher education (74.4%). Most participants were living in a family of four people including their children (47.3%) and in houses with three rooms excluding kitchen, toilet, and bathroom (94.8%). Most (91.8%) of the participants had access to outside space for their children to play or hang out which in most cases was a garden. Slightly more than half of the participants (56.0%) reported having friends or family members who are considered as belonging to a high risk of having COVID-19, however, none of them lived with the participants during the lockdown. One in ten (10.5%) of the participants belonged to an at-risk group. Children's ($n_{boys} = 505$, 54.5%) mean age was 7.45 years ($SD = 2.04$; range: 5 – 11 years) and most were attending state schools (90.3%).

Table 1. Participant sociodemographic characteristics

	<i>n</i>	%
Respondent's Ethnic background		
White British	645	69.6
White Other Background	208	22.5
Mixed Background	17	1.9
Asian Background	20	2.1
Black	4	.4
Chinese or Chinese British	3	.3
Other Ethnic Background	8	.9
Prefer not to say	22	2.4
Marital Status		
Married	689	74.3
Widowed	4	.4
Divorced	41	4.4
Separated	44	4.7
Never Married	149	16.1
Access to outside space where child can play or hang out		
Yes	851	91.8
No	76	8.2

	<i>n</i>	%
Mostly used outside space?		
Only windows	4	.5
Garden	788	92.6
Terrace	25	2.9
Balcony	14	1.6
Another exit to open air	20	2.4
Mother's education		
No qualifications	8	.9
Completed GCSE/CSE/O-levels or equivalent (at school up to age 16)	65	7.0
Completed post-16 vocational courses	33	3.6
A-levels or equivalent (at school up to age 18)	106	11.4
Undergraduate degree or professional qualification	346	37.3
Postgraduate degree	344	37.1
Other	25	2.7
Father's education		
No qualifications	38	4.1
Completed GCSE/CSE/O-levels or equivalent (at school up to age 16)	128	13.8
Completed post-16 vocational courses	71	7.7
A-levels or equivalent (at school up to age 18)	96	10.4
Undergraduate degree or professional qualification	311	33.5
Postgraduate degree	235	25.4
Other	48	5.2
Mother's employment status		
Self-employed	122	13.2
Part-time	276	29.8
Full-time	265	28.6
Unemployed	105	11.3
Other	120	12.9
Lost job due to COVID-19	25	2.7
Smart-working	14	1.5
Father's employment status		
Self-employed	198	21.4
Part-time	28	3.0
Full-time	580	62.6
Unemployed	21	2.3
Other	67	7.2
Lost job due to COVID-19	19	2.0
Smart-working	14	1.5
Caregiver's situation concerning COVID-19		
Belong to a risk group	97	10.5
People belonging to a risk group live with the participants	89	9.6
Friends or family are at-risk population (not living with the participants)	519	56.0
I do not know anyone who belongs to an at-risk population	222	23.9
Education type		
State School	837	90.3
Independent School	70	7.6
Home Educated	12	1.3
Other	8	.9

	<i>n</i>	%
School year group		
Reception (5 yrs)	184	20.1
Year 1 (6 yrs)	161	17.6
Year 2 (7 yrs)	134	14.6
Year 3 (8 yrs)	118	12.9
Year 4 (9 yrs)	116	12.7
Year 5 (10 yrs)	99	10.8
Year 6 (11 yrs)	103	11.3

Procedure

As face-to-face contact was not possible due to the Covid-19 pandemic, an online survey was administered electronically via social networks (e.g. Facebook, Instagram), e-mail, messaging groups (e.g., Whatsapp) between 14th July 2020 and 14th August 2020 using a snowball sampling strategy. Information about the objectives of the study was provided and informed consent was requested. The study was approved by the University of Roehampton Research Ethics Committee.

Instruments

The Family daily routines and children's emotional and behavioural symptoms questionnaire was developed by Orgilés et al, (2020) and was used to measure change in families' daily routines and children's mental health during the COVID-19 lockdown, a) caregiver and child sociodemographic information including housing conditions (e.g. house size, number of rooms, existence of outside space such as garden, balcony, or terrace); b) caregiver perceived impact of the lockdown on children's emotional and behavioural symptoms rated on a five-point scale (*1=much less compared to before quarantine - 5 = much more compared to before quarantine*); c) caregiver perception of family coexistence during quarantine rated on a five-point scale (*1=very easy - 5=very difficult*); d) children's daily routines during lockdown compared to before: time of screen use and duration of physical activity rated on a six-point scale (*1=less than 30 minutes - 6=more than 180 minutes*), and sleep hours.

The Kessler (K6) Psychological Distress Scale (PDS) (Kessler *not in italics.*, 2002) was used to examine caregiver psychological well-being during the lockdown. The K6 assesses the frequency of psychological distress over a period of 30 days prior to administration rated on a five-point scale (*0 = none of the time - 4 =all of the time*; range = 0 – 24). The items are summed to yield a total score of psychological distress which is classified as follows: ≤ 4 = No Impairment; $4 < \cdot < 13$: Moderate Illness; ≥ 13 = Serious Mental Illness (Kessler et al., 2003). The scale has demonstrated excellent internal consistency and reliability (Cronbach's alpha = .89) (Kessler et al., 2002).

Data Analyses

Statistical analyses were performed using the IBM SPSS (Statistical Package for the Social Sciences) software version 17.0. The McNemar test was used to examine the differences in the distribution of children's screen use and physical activity time before and during lockdown and the t-test for related groups to examine the difference in children's mean sleep time before and during the lockdown. To examine the association between caregivers' psychological distress and perceived change in their children's emotional and behavioural symptoms before and during the lockdown, Pearson correlations were used.

Table 2. Caregiver perception of the change in child emotional and behavioural symptoms before and during the lockdown

Child symptoms	Much less n (%)	Somewhat less n (%)	Same n (%)	Somewhat more n (%)	Much more n (%)
My child is worried	27 (2.9)	63 (6.8)	350 (37.9)	317 (34.3)	167 (18.1)
My child is restless	29 (3.2)	64 (7.0)	340 (37.0)	311 (33.8)	176 (19.1)
My child is anxious	33 (3.6)	72 (7.8)	402 (43.5)	251 (27.1)	167 (18.1)
My child is sad	42 (4.6)	84 (9.2)	394 (42.9)	272 (29.6)	126 (13.7)
My child has nightmares	64 (6.9)	31 (3.4)	688 (74.6)	106 (11.5)	33 (3.6)
My child is reluctant	33 (3.6)	37 (4.0)	430 (46.8)	291 (31.7)	127 (13.8)
My child feels lonely	38 (4.1)	28 (3.0)	261 (28.3)	358 (38.9)	236 (25.6)
My child is uneasy	42 (4.6)	47 (5.1)	441 (48.1)	276 (30.1)	111 (12.1)
My child is nervous	45 (4.9)	52 (5.7)	483 (52.6)	240 (26.1)	99 (10.8)
My child argues with the rest of the family	31 (3.4)	44 (4.8)	324 (35.2)	306 (33.2)	216 (23.5)
My child is very quiet	68 (7.4)	109 (11.8)	631 (68.5)	89 (9.7)	24 (2.6)
My child cries easily	29 (3.2)	31 (3.4)	505 (55.1)	258 (28.1)	94 (10.3)
My child is angry	30 (3.3)	31 (3.4)	412 (44.7)	275 (29.9)	173 (18.8)
My child feels frustrated	27 (2.9)	30 (3.3)	298 (32.4)	374 (40.7)	190 (20.7)
My child is bored	14 (1.5)	26 (2.8)	202 (21.9)	361 (39.1)	321 (34.7)
My child is irritable	28 (3.1)	24 (2.6)	342 (37.3)	336 (36.6)	188 (20.5)
My child has no appetite	76 (8.3)	100 (10.9)	618 (67.1)	102 (11.1)	25 (2.7)
My child has difficulty concentrating	14 (1.5)	33 (3.6)	486 (52.9)	265 (28.8)	121 (13.2)
My child is afraid of COVID-19 infection	33 (3.6)	40 (4.3)	454 (49.2)	295 (32.0)	100 (10.8)
My child is very dependent on us	17 (1.8)	67 (7.3)	517 (56.3)	209 (22.7)	109 (11.9)
My child has behavioural problems	35 (3.8)	37 (4.0)	607 (66.0)	163 (17.7)	78 (8.5)
My child eats a lot	21 (2.3)	41 (4.5)	543 (59.0)	221 (24.0)	95 (10.3)
My child worries when one of us leaves the house	25 (2.7)	20 (2.2)	662 (72.0)	148 (16.1)	65 (7.1)
Other changes (if any)	7 (2.5)	7 (2.5)	212 (76.8)	19 (6.9)	31 (11.2)

Results

Perceived change in children's emotional and behavioural symptoms before and during the lockdown

Caregivers noticed changes in their children's behaviour and emotional states. According to caregiver report (Table 2) children were more bored (73.8%), lonely (64.5%), sad (43.4%), frustrated (61.4%), irritable (57.1%), restless (52.9%), worried (52.4%), angry (48.6%), anxious (45.2%), and were more likely to argue with the rest of the family (29.7%) during the lockdown compared to the pre-COVID-19 period.

Family coexistence during the quarantine and perception of psychological distress during the lockdown

On average, caregivers reported that family coexistence during the lockdown was moderately difficult ($M = 2.83$, $SD = 1.10$; range = 1-5). Frequency distributions, revealed that difficulties with family coexistence varied in intensity however most caregivers reported some level of difficulty with approximately 1 in 3 (34.4%) feeling that it was difficult or very difficult and 1 in 3 (36.5%) feeling that it was moderately difficult.

Caregivers' psychological distress score on the K6 scale suggests that on average caregivers experienced moderate levels of psychological distress ($M = 6.78$, $SD = 5.26$); 42.4% of the caregivers experienced moderate psychological distress ($4 < K6 \text{ score} < 13$) and 15.4% experienced severe psychological distress ($K6 \text{ score} \geq 13$).

Children's patterns of screen use, physical activity, and sleep routine before and during the lockdown

Table 3 presents children's patterns of screen use, daily physical activity, and sleep before and during the lockdown. According to caregiver report children spent significantly more time using screens including iPads, TVs, mobiles, or computers during the lockdown period ($\chi^2(15, n = 927) = 808.14$, $p < .001$). For example, the time of screen use for 1.5-2 hours almost doubled during the lockdown. Additionally, the daily rate of screen use for more than 3 hours increased from 1.4% to 33.8% and use for less than 30 minutes decreased from 13.4% to 1.6%. Children spent significantly less time in daily physical activity ($\chi^2(15, n=927) = 121.26$, $p < .001$); the proportion of children with low physical activity (30 mins <) increased from 3.7% to 16.2%, and the proportion of children reported to be engaged in physical activity between 1.5 – 2 hours as well as of those highly engaged (> 3 hours) was nearly halved down from 20.3% to 13.5% and from 10.1% to 5.8%, respectively. The difference in sleep time before and during the lockdown was statistically significant with children sleeping for half an hour more before than during the lockdown ($t = 8.10$, $p = .00$).

Association between caregiver psychological distress and change in child emotional and behavioural symptoms before and during the lockdown

Table 4 shows that there were significant correlations, albeit of small magnitude ($r \text{ range} = .07 - .25$) between caregivers' level of psychological distress and most of child emotional and behavioural symptoms (i.e. 20 of the 23 symptoms). Caregivers with higher psychological distress were significantly more likely to report their children being more worried, restless, anxious, sad, lonely, uneasy, nervous, angry, frustrated, bored, and irritable during than before the lockdown. Moreover, they were more likely to report that their children were more afraid of COVID-19 infection, more likely to argue with the rest of the family, cried more easily, ate a lot, had more difficulty concentrating, had more behavioural problems, were more

Table 3. Children's patterns of daily screen use, daily physical activity, and hours of sleep before and during the lockdown

	Before Lockdown <i>n</i> (%)	During Lockdown <i>n</i> (%)
Use of Screens (minutes)		
Less than 30	124 (13.4)	15 (1.6)
From 30 to 60	352 (38.0)	58 (6.3)
From 60 to 90	299 (32.3)	112 (12.1)
From 90 to 120	112 (12.1)	201 (21.7)
From 120 to 180	27 (2.9)	228 (24.6)
More than 180	13 (1.4)	313 (33.8)
Physical Activity (minutes)		
Less than 30	34 (3.7)	150 (16.2)
From 30 to 60	269 (29.0)	303 (32.7)
From 60 to 90	280 (30.2)	233 (25.1)
From 90 to 120	188 (20.3)	125 (13.5)
From 120 to 180	62 (6.7)	62 (6.7)
More than 180	94 (10.1)	54 (5.8)
Hours of sleep/day <i>M</i> (<i>SD</i>)	9.93 (1.45)	9.55 (1.76)

dependent on them, and were more worried when one of the parents left the house.

Small to strong significant correlations (r range = .07 - .43) were found between caregivers' perception of how easy it was for the family to live together during the lockdown and 22 of the 23 child symptoms (Table 4). When family coexistence during the lockdown was rated as more difficult, children were perceived significantly more worried, restless, anxious, sad, reluctant, lonely, uneasy, nervous, quiet, angry, frustrated, bored, and irritable during than before the quarantine. Additionally, they were significantly more likely to be reported to be afraid of COVID-19 infection, to argue with the rest of the family, to cry more easily, to eat a lot, to have more difficulty concentrating, more behavioural problems and nightmares, to be more dependent on them and more worried when one of the parents left the house.

Table 4. Pearson correlations between caregiver psychological distress on the Kessler PDS and perceived change in child emotional and behavioural symptoms before and during the lockdown

Child symptoms***	Psychological distress	Coexistence difficulty
My child is worried	.16**	.29**
My child is restless	.18**	.34**
My child is anxious	.23**	.33**
My child is sad	.18**	.36**
My child has nightmares	.06	.13**
My child is reluctant	.20**	.32**
My child feels lonely	.15**	.26**
My child is uneasy	.25**	.34**
My child is nervous	.25**	.32**
My child argues with the rest of the family	.18**	.43**
My child is very quiet	.02	.07*
My child cries easily	.21**	.31**
My child is angry	.21**	.39**
My child feels frustrated	.22**	.39**
My child is bored	.23**	.42**
My child is irritable	.24**	.42**

Child symptoms***	Psychological distress	Coexistence difficulty
My child has no appetite	-.01	.03
My child has difficulty concentrating	.23**	.32**
My child is afraid of COVID-19 infection	.16**	.17**
My child is very dependent on us	.22**	.26**
My child has behavioural problems	.21**	.32**
My child eats a lot	.07*	.08*
My child worries when one of us leaves the house	.17**	.12**

* $p < .05$; ** $p < .001$; ***for child symptoms mean scores please contact the corresponding author

Discussion

The unexpected outbreak and rapid spread of COVID-19 in the Spring of 2020 put the mental health of children and their families in the UK and other countries at risk. Understanding the influence of social distancing measures imposed to contain the spread of the virus is a pressing research question (Fegert, Vitiello, Plener, & Clemens, 2020). The study explored the psychological effects of the COVID-19 lockdown on children and their families in the UK using an electronically distributed survey. It examined changes in children's emotional and behavioural wellbeing and daily routine before and during the lockdown according to caregivers' perceptions, family dynamics, and the association between parental mental health and changes in children's emotional state and behaviour before and during the lockdown. To the best of our knowledge, this study is among the first to examine the impact of the COVID-19 lockdown on children's emotional wellbeing, behaviour, and lifestyle.

The results showed that a high percentage of the caregivers noticed mild or significant changes in their child's emotional state and behaviour during the lockdown. Increase in boredom followed by increase in feeling lonely and frustrated were the most prominent changes reported by approximately two thirds of the caregivers. Increases were also noted in irritability, restlessness, anger, anxiety, sadness, worry and being likely to argue with the rest of the family by approximately one third of the participants. Although these are descriptive findings, they suggested that children in the UK are likely to have been impacted emotionally and behaviourally by the lockdown and are in alignment with other studies about the consequences of COVID-19 lockdown on child mental health and well-being in Italy and Spain (Orgilés et al., 2020) and in China (Duan et al., 2020). An important extension of this research is the examination of the variation of the magnitude of change according to caregiver and child characteristics. An interesting observation is that despite nearly 9 in 10 participants reporting having access to a garden for children to play children's boredom increased suggesting that having a garden may not contribute significantly to mitigating feelings of boredom. This speculation requires further examination and if confirmed it will have important implications for research on how outdoor space can be used to support children's mental health successfully during times of social distancing as well as generally.

In addition to changes in children's social and emotional wellbeing, the findings revealed significant changes in their daily habits. Specifically, 24 times as many children as before the lockdown were likely to use screens for more than three hours during the lockdown, the chance of engaging in physical activity for 1.5 to 2 hours was halved and they slept half an hour less than before the lockdown. The findings are in agreement with findings from other COVID-19 affected

countries on the impact of the quarantine on children's screen use time and physical activity (Orgilés et al., 2020; Moore et al., 2020) and confirm the negative association between lockdown-related restrictions and children's lifestyle in the UK. Further research is needed to examine if the magnitude of change in children's daily activities was associated to caregiver and/or child characteristics and whether the reported changes increased the risk of mental health difficulties in the long-term.

Most caregivers reported moderate or significant difficulty with family coexistence and psychological distress during the quarantine. Correlation analysis showed that caregivers who reported difficulties with family coexistence and those with more psychological distress were significantly more likely to perceive changes in their children's emotional and behavioural functioning. The association between parental mental health and poor child outcomes is strong (Leijdesdorff, van Doesum, Popma, Klaassen, & van Amelsvoort, 2017). The difficulty in responding to the child's needs that some parents with mental illness may experience could trigger aggressive and negative behaviours in children (Pinquart, 2017). The association between family coexistence and perceived change in children's emotional and behaviour functioning was strong and significant but the mechanism whereby it influences children's wellbeing is less understood. One plausible explanation is that family coexistence influences children's emotional wellbeing and behaviour through the indirect impact of overcrowding living conditions, but further research is required to empirically test the above speculation. Additionally, more research is needed to examine the associations of family coexistence and psychological distress with changes in children's emotional and behavioural functioning in the context of important parent and caregiver characteristics. If the associations are replicated once population characteristics are considered, they will contribute significantly to our understanding of the challenges experienced by certain segments of the society under lockdown, such as parents with mental health difficulties, and the implications of social distancing policies on public mental health.

The present study had certain methodological limitations. Because the participants were primarily highly educated White British mothers, generalisation of the findings to other ethnic and/or socioeconomic groups should be approached with cautiousness. The cross-sectional study design did not allow to examine the long-term impact of the changes in children's emotional and behavioural functioning before and during the quarantine on children's outcome. Changes in children's emotions and behaviour were based only on perceived parental report and not on independent observations. Finally, the assessment of change in children's emotional and behavioural functioning was based on parents' perceptions at one point in time and towards the end of the lockdown when the society had started opening-up. Notwithstanding these methodological limitations, the findings have some implications for the development of intervention programmes to mitigate the negative impact of COVID-19 on children and their families.

Acknowledgements

We are grateful to Professor Mireia Orgilés for the inspiration she provided with her paper and the survey developed. Special thanks also to everyone who participated in our survey for sharing their views and personal experiences during challenging times of COVID-19 lockdown. We are grateful to them for their openness and honesty about mental health and wellbeing of themselves and their children.

Conflict of interests

The authors declare no conflict of interest.

References

- Brazendale, K., Beets, M. W., Weaver, R. G., Russell, R. P., Gabrielle, M. T., Kaczynski, A. T., Chandler, J. L., Bohnert, A., & Hippel, P. T. (2017). Understanding differences between summer vs. school obesogenic behaviors of children: the structured days hypothesis. *The International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 100. <https://doi.org/10.1186/s12966-017-0555-2>
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessley, S., Greenberg, N., & Rubin, J. G. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, 395(10227), 912-920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Dalton, L., Rapa, E., & Stein, A. (2020). Protecting the psychological health of children through effective communication about COVID-19. *The Lancet Child & Adolescent Health*, 4(5), 346-347. [https://doi.org/10.1016/S2352-4642\(20\)30097-3](https://doi.org/10.1016/S2352-4642(20)30097-3)
- Duan, L., Shao, X., Wang, Y., Huang, Y., Miao, J., Yang, X., & Zhu, G. (2020). An investigation of mental health status of children and adolescents in China during the outbreak of COVID-19. *Journal of Affective Disorders*, 275, 112-118. <https://doi.org/10.1016/j.jad.2020.06.029>
- Fegert, J. M., Vitiello, B., Plener, P. L., & Clemens, V. (2020). Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. *Child and Adolescent Psychiatry and Mental Health*, 14, 1-11. <https://doi.org/10.1186/s13034-020-00329-3>
- Frank, A., & Grady, C. (2020, March 22). Phone booths, parades, and 10-minute test kits: How countries worldwide are fighting Covid-19. Vox, Retrieved from <https://www.vox.com/science-and-health/2020/3/22/21189889/coronavirus-covid-19-pandemic-response-south-korea-philippines-italy-nicaragua-senegal-hong-kong>
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R. C., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A. ... Bullmore, E., & Everall, I. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry*, 7(6), 547-560. [https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/10.1016/S2215-0366(20)30168-1)
- Jiao, W. Y., Wang, L. N., Liu, J., Fang, S. F., Jiao, F. Y., Pettoello-Mantovani, M., & Somekh, E. (2020). Behavioral and Emotional Disorders in Children during the COVID-19 Epidemic. *The Journal of Pediatrics*, 221, 264-266. e1. <https://doi.org/10.1016/j.jpeds.2020.03.013>
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L., Walters, E. E., & Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32(6), 959-976. <https://doi.org/10.1017/S0033291702006074>
- Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., Howes, M. J., Normand, S. L., Manderscheid, R. W., Walters, E. E., & Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry*, 60(2), 184-189. <https://doi.org/10.1001/archpsyc.60.2.184>

- Leijdesdorff, S., van Doesum, K., Popma, A., Klaassen, R., & van Amelsvoort, T. (2017). Prevalence of psychopathology in children of parents with mental illness and/or addiction: an up to date narrative review. *Current Opinion in Psychiatry*, 30(4), 312-317.
- Liu, J. J., Bao, Y., Huang, X., Shi, J., & Lu, L. (2020). Mental health considerations for children quarantined because of COVID-19. *The Lancet Child & Adolescent Health*, 4(5), 347-349. [https://doi.org/10.1016/S2352-4642\(20\)30096-1](https://doi.org/10.1016/S2352-4642(20)30096-1)
- Loades, M. E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafran, R., Brigden A., Linney, C., McManus, M. N., Borwick, C., & Crawley E. (2020). Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19. *Journal of American Academy of Children and Adolescent Psychiatry*. <https://doi.org/10.1016/j.jaac.2020.05.009>
- Moore, S. A., Faulkner, G., Rhodes, R. E., Brussoni, M., Chulak-Bozzer, T., Ferguson, L. J., Mitra, R., O'Reilly, N., Spence, J. C., Vanderloo, L.M., & Tremblay, M. S. (2020). Impact of the COVID-19 virus outbreak on movement and play behaviours of Canadian children and youth: a national survey. *International Journal of Behavioral Nutrition and Physical Activity*, 17(1), 1-11. <https://doi.org/10.1186/s12966-020-00987-8>
- Orgilés, M., Morales, A., Delvecchio, E., Francisco, R., Mazzeschi, C., Pedro, M., & Espada, J. P. (2020). Coping behaviors and psychological disturbances in youth affected by the COVID-19 health crisis. Available from: <https://psyarxiv.com/2gnxb>
- Orgilés, M., Morales, A., Delvecchio, R., Mazzeschi, C., & Espada, J. P. (2020). Immediate psychological effects of the COVID-19 quarantine in youth from Italy and Spain. Available from: <https://psyarxiv.com/5bpfz>
- Pearcey, S., Shum, A., Waite, P., Patalay, P., & Creswell, C. (2020). The Co-Space Study Report 04: Changes in Children and Young People's Emotional and Behavioural Difficulties through Lockdown. Retrieved from <https://emergingminds.org.uk/wp-content/uploads/2020/06/CoSPACE-Report-4-June-2020.pdf>
- Pinquart, M. (2017). Associations of parenting dimensions and styles with externalizing problems of children and adolescents: An updated meta-analysis. *Developmental Psychology*, 53(5), 873-932. <https://doi.org/10.1037/dev0000295>
- Prime Minister's Office. (2020). Prime Minister's statement on coronavirus - COVID-19. Retrieved from: <https://www.gov.uk/government/speeches/pm-address-to-the-nation-on-coronavirus-23-march-2020>
- Spinelli, M., Lionetti, F., Pastore, M., & Fasolo, M. (2020). Parents' stress and children's psychological problems in families facing the COVID-19 outbreak in Italy. *Frontier in Psychology*, 11(1713). <https://doi.org/10.3389/fpsyg.2020.01713>
- Sylva, K. (1994). School influences on children's development. *Journal of Child Psychology and Psychiatry*, 15(1), 135-170. <https://doi.org/10.1111/j.1469-7610.1994.tb01135.x>
- Waite, P., & Creswell, C. (2020). The Co-Space Study Report 01: Findings from the first 1500 participants on parent/carer stress and child activity. Retrieved from <https://emergingminds.org.uk/wp-content/uploads/2020/04/Co-SPACE-initial-report-first-1500-participants-06-04-20.pdf>
- Waite, P., Patalay, P., Moltrecht, B., McElroy, E., & Creswell, C. (2020). The Co-Space Study Report 02: Covid-19 worries, parent/carer stress and support needs, by child special educational needs and parent/carer work status. Retrieved from https://emergingminds.org.uk/wp-content/uploads/2020/05/Co-SPACE-report-02_03-05-20.pdf
- Wang, G., Zhang, J., Lam, S.P., Li, S.X., Jiang, Y., Sun, W., Chan, N.Y., Kong, A. P., Zhang, Y., Li, S., Li, A.M., Jiang, F., & Wing, Y.K. (2019). Ten-year secular trends in sleep/wake patterns in Shanghai and Hong Kong school-aged children: a tale of two cities. *Journal of Clinical Sleep Medicine*, 15(10), 1495-1502. <https://doi.org/10.5664/jcsm.7984>
- Wang, G., Zhang, Y., Zhao, J., Zhang, J., & Jiang, F. (2020). Mitigate the effects of home confinement on children during the COVID-19 outbreak. *The Lancet*, 395 (10228), 945-947. [https://doi.org/10.1016/S0140-6736\(20\)30547-X](https://doi.org/10.1016/S0140-6736(20)30547-X)
- World Health Organization. (2020). Coronavirus disease (COVID-19) pandemic. Retrieved from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- Worldometer. (2020). Total Coronavirus Cases in the United Kingdom. Retrieved from: <https://www.worldometers.info/coronavirus/country/uk/>
- Worldometer. (2020). Total Coronavirus Cases in the World. Retrieved from: <https://www.worldometers.info/coronavirus/>