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Regular Article

Course of child social–emotional and sleep symptoms, parental distress and pandemic-related stressors during COVID-19

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Abstract

Research on the longitudinal courses of child social–emotional symptoms and sleep during the COVID-19 pandemic within societies would be of key value for promoting child well-being in global crises. We characterized the course of children's social–emotional and sleep symptoms before and throughout the pandemic in a Finnish longitudinal cohort of 1825 5- to 9-year-old children (46% girls) with four follow-up points during the pandemic from up to 695 participants (spring 2020–summer 2021). Second, we examined the role of parental distress and COVID-related stressful events in child symptoms. Child total and behavioral symptoms increased in spring 2020 but decreased thereafter and remained stable throughout the rest of the follow-up. Sleep symptoms decreased in spring 2020 and remained stable thereafter. Parental distress was linked with higher child social–emotional and sleep symptoms. The cross-sectional associations between COVID-related stressors and child symptoms were partially mediated by parental distress. The findings propose that children can be protected from the long-term adverse influences of the pandemic, and parental well-being likely plays a mediating role between pandemic-related stressors and child well-being. Further research focusing on the societal and resilience factors underlying family and child responses to the pandemic is warranted.

Keywords: COVID-19; children; parental distress; social–emotional symptoms; sleep

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The COVID-19 pandemic has affected mental health around the world, with an increased prevalence of psychiatric symptoms among the adult population compared to pre-pandemic levels (Xiong et al., 2020). These observations are in line with those made during previous smaller-scale epidemics, such as SARS-CoV-1 (Cheung et al., 2008), Middle East Respiratory Syndrome (Jeong et al., 2016) and Ebola (Cénat et al., 2020). Considering the universal influences of lockdown and other restrictive measures, such as home confinement, many such measures may have specifically affected the families of young children (Park et al., 2020; Pierce et al., 2020). For instance, schools and daycare centers were closed, extracurricular activities were halted and parents had less access to social support and resources such as the help of family members in childcare (Ritchie et al., 2020). Moreover, the indirect consequences of the pandemic, such as economic losses, may have hit especially hard within families that often face higher economic demands (Waxman et al., 2020).

Childhood is generally considered a period of heightened sensitivity to environmental influences, such as the quality of parenting. Parental distress is one factor that has established associations with poorer quality of parenting, such as harsher parenting practices, and ultimately, with child well-being; this has also been the case during COVID-19 (Brown et al., 2020; Johnson et al., 2021; Spinelli et al., 2021). Harsher parenting practices have also been reported during previous epidemics (Green et al., 2018). Furthermore, restrictive measures, such as quarantine, have been shown to adversely affect children's mental health (Sprang & Silman, 2013). Consequently, the COVID-19 pandemic may have influenced the course of children's social–emotional development

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(Hawrilenko et al., 2021; Ma et al., 2021; Racine et al., 2021). This is highly relevant because problems in childhood social–emotional development, such as internalizing and externalizing symptoms (Achenbach & Edelbrock, 1978), impulsivity, problems in forming and maintaining relationships and lack of prosocial skills (Goodman, 1997), are related to psychiatric disorders and symptoms in adolescence and adulthood (Finsaas et al., 2018; Morken et al., 2021; Silver et al., 2021). A better understanding of the developmental courses of social–emotional symptoms during pandemics is necessary to prevent and alleviate children's suffering in global crises.

There is still limited understanding of child long-term social–emotional response to epidemics before COVID-19. Most studies focused on COVID-19 and child mental health are based on parental reports and focus on the child's psychological response to the early pandemic (in spring 2020) in comparison to the pre-pandemic period. Preliminary review evidence points to some increase in the prevalence of internalizing-type symptoms in children aged 4 to 18 years; however, this change seemed to more strongly concern adolescents (Ma et al., 2021; Racine et al., 2021). In empirical studies, an increase in internalizing symptoms has also been reported in slightly younger (8–11-year-old) participants (Bignardi et al., 2021), while one study in Australia that included a wide age range of children (0–18 years, on average 9 years) detected no change in child depression symptoms (Westrupp et al., 2021).

In contrast, a UK study of 4–16-year-old child symptoms covering the beginning of the pandemic found some increase in externalizing (behavioral and hyperactivity/inattention) symptoms, but no change or even some decline in internalizing symptoms by summer 2020 (Raw et al., 2021). It is noteworthy that this study used no data prior to the pandemic outbreak. In contrast to the observation that only adolescents would be affected, studies from the US, Germany and Italy focusing on children younger than 10 years reported an increase in both internalizing and externalizing symptoms (Di Giorgio et al., 2021; Feinberg et al., 2021; Ravens-Sieberer et al., 2021), while no deterioration in adolescent psychological well-being symptoms was detected (Koenig et al., 2021). Recent studies extending their follow-up to 2021 have also confirmed an increase in internalizing symptoms in school-aged children (Gruhn et al., 2022; Xie et al., 2022), but in these studies, no comparison to baseline levels before the pandemic was available.

Recently, the role of sleep in the development of emotional and behavioral problems has been emphasized (Gregory & Sadeh, 2016). The consideration of sleep has been especially relevant during the COVID-19 pandemic, which in itself poses a risk for the quality of sleep, including increased distress, time spent indoors, and use of technology (Becker & Gregory, 2020; Illingworth et al., 2022); correspondingly, there is preliminary evidence for the correlation of poorer sleep and worsened mental health in children during the pandemic (Di Giorgio et al., 2021; Illingworth et al., 2022; McArthur et al., 2021). A meta-analysis showed a heightened prevalence of sleep disturbances at the beginning of the pandemic in other age groups but not in younger (2–6-year-old) children (Sharma et al., 2021). In one study, a decrease in sleep disturbances was identified in younger children at the beginning of the pandemic (Dellagiulia et al., 2020); however, contradictory findings have been reported (Bruni et al., 2021). Sleep duration was also reported to increase, indicating improvements in child sleep (Illingworth et al., 2022). To our knowledge, few studies reporting the course of sleep problems during the pandemic extending to 2021 are available.

Moreover, longitudinal research on the direct and indirect associations between COVID-related stressful events within the family and child well-being would be needed to identify modifiable family resilience factors (e.g., parental well-being) (Masten, 2018) instead of the non-modifiable aspects related to the pandemic. Several prior studies universally support the anticipated association between poorer parental mental health during the pandemic, such as depressive and anxiety symptoms and stress, and more child social–emotional symptoms (Davidson et al., 2021; Feinberg et al., 2021; Frigerio et al., 2022; Giannotti et al., 2021; Kerr et al., 2021; Liu et al., 2021; Martiny et al., 2021; McArthur et al., 2021; Moulin et al., 2021; Saddik et al., 2021) and child sleep problems (Cellini et al., 2021; Markovic et al., 2021; Zreik et al., 2021). However, none of these studies examined the independent role of COVID-related stressors in child social–emotional symptoms when parental distress is taken into account, although these hardships may be linked with child symptoms and emotional discomfort (Gassman-Pines et al., 2020; Scrimin et al., 2022).

Taken together, there is little understanding of the changes in child social–emotional and sleep symptoms longitudinally across the pandemic and the role of parental distress and COVID-related stressors in these symptom courses. Prior research points to a dynamic change in adult and parental symptoms, along with the pandemic situation (Gustafsson et al., 2021; Hyland et al., 2021). Furthermore, it is suggested that the pandemic has not been detrimental to the well-being of all families (Le Vigouroux et al., 2021; Pugliese et al., 2022; Sorkkila & Aunola, 2022) and that some children may even have benefited from the drastic change in everyday lives (Cost et al., 2022; Soneson et al., 2022). For instance, greater parent resilience has been associated with less parental burnout (Sorkkila & Aunola, 2022) and less child externalizing and internalizing behaviors even in the presence of longitudinal distress during the pandemic (Pugliese et al., 2022). Furthermore, the authors hypothesized that some children with a prior diagnosis, such as social anxiety or learning problems, could have benefited from more time spent at home instead of at school (Cost et al., 2022). As many as one-third of a large sample of school-aged children in the UK reported increased happiness during the early pandemic lockdown (Soneson et al., 2022).

The focus on the benefits of the pandemic for mental health could be especially notable in societies (e.g., Finland and other Nordic countries) with lower incidences of COVID-19 cases (Ritchie et al., 2020). Correspondingly, the restrictive measures applied in Finland were less stringent than in many other Western societies; there was only a short period of broad school closures at the beginning of the pandemic (spring 2020), and children in Grades 1 to 3 (i.e., younger than 9–10 years of age) were allowed to go to school and attend daycare even during this period. Furthermore, during the summers of 2020 and 2021, the restrictions were relatively mild because the incidence of COVID was low. On the other hand, families were still affected by measures such as strict remote work instructions, closure of school for older children and broad closure of free activities in spring 2020 and from December 2020 to June 2021 (Hale et al., 2021; Ritchie et al., 2020), before the vaccines were available for all citizens.

Further knowledge of children's symptom courses within different societies, including those with a less severe course of COVID-19, would be of key value for the promotion of child and adolescent social–emotional well-being during the pandemic, its aftermath and during future global crises. The aim of this study was to examine the course of child social–emotional and sleep symptoms over the COVID-19 pandemic (spring 2020–summer

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2021) in a Finnish longitudinal cohort of 4- to 9-year-old children. Data was available from altogether 1825 children before pandemic and from 385 to 695 children across the pandemic follow-up time points. As one of the first studies using such an approach, we conducted mixed models using measures of child social–emotional symptoms (internalizing, externalizing, hyperactivity/inattention, peer relationship problems and prosocial skills) and sleep symptoms longitudinally before and during the pandemic, controlling for child age as a continuous variable and both maternal and paternal reports of child symptoms. We also examined the associations between parental distress (i.e., anxiety and depressive symptoms separately) and child outcomes and the role of parental distress in the change in child symptoms over time. Finally, we tested whether COVID-related stressful events (e.g., CoV-2 infection within the family or parental economic difficulties) had direct associations with child social–emotional and sleep symptoms across the pandemic, and whether the observed associations were mediated by parental distress. The approach for the longitudinal symptoms was descriptive, considering the lack of prior data on child symptom development and inconsistent earlier findings from a range of geographical areas and differences in pandemic measures. We hypothesized, however, that parental distress would be related to child social–emotional and sleep symptoms over and above the COVID-19 stressful life events.

Methods and Materials

Participants and Procedures

The sample of the present study is part of the FinnBrain Birth Cohort Study ($N = 3{,}808$ families), a prospective cohort study focusing on the impacts of prenatal and early-life stress on child brain development and health (Karlsson et al., 2018). The families were recruited in the cohort between December 2011 and April 2015 from maternal welfare clinics at 12 weeks' gestation in the area of Turku and Åland Islands, Finland. After the outbreak of the COVID-19 pandemic (T0, 28 February 2020), the parents in the baseline cohort were contacted by e-mail in May 2020 (T1) and invited to respond to the electronic questionnaire concerning parental distress, COVID-related stressors, other negative life events and child symptoms and sleep during the pandemic. Next, the parents responding to the T1 questionnaire ($N = 856$) were invited to respond to the follow-up questionnaires in August 2020 (T2), December 2020 (T3), March 2021 (T4) and June 2021 (T5). Parent reports of the child symptoms from at least one time point were available from $N = 1825$ children with $N = 695$, $N = 562$, $N = 491$, and $N = 385$ parents reporting the child symptoms during the pandemic time points T1, T2, T3 and T5, respectively (Table 1; see also the information on the families where a report by both parents was available). Only parental distress was additionally measured at T4. Longitudinally, there were $N = 517$ children with data from only one time point (rated by either parent), $N = 636$ from two time points, $N = 113$ from three time points, $N = 149$ from four time points, $N = 161$ from five time points and $N = 249$ from all six time points of the follow-up. Additionally, the sample sizes of children with data available from both pre-pandemic and pandemic varied from $N = 100$ with one follow-up time point, $N = 143$ with two follow-up time points, $N = 178$ with three follow-up time points and $N = 243$ with four follow-up time points during the pandemic. There were $N = 54$ children data during the pandemic but not during the pre-pandemic time points.

With regard to the background variables, parents responded to questions concerning their education at the cohort baseline. Information about child biological sex was retained at the time of birth. As a part of the follow-up of the baseline cohort, the parents responded to the questionnaires on child social-emotional and sleep symptoms and sleep and their own distress (depressive and anxiety symptoms) at the child ages of 4 and 5 years. The sociodemographic characteristics of the families are reported in Table 1. Attrition analyses are presented in the Appendix. The Ethics Committee of Hospital District of the Southwest Finland has approved the study baseline protocol (14.6.2011 57/180/2011 § 168) and the protocol for the COVID-19 follow-up (#17/1802/2020). The study was conducted in accordance with the Declaration of Helsinki.

Measures

The descriptive statistics of child social–emotional and sleep symptoms are described in Table 2. The scales were used as continuous measures in the present study.

Child social–emotional symptoms

Social–emotional symptoms were assessed using the Strengths and Difficulties Questionnaire (SDQ), which is a validated tool for the universal screening of social–emotional symptoms and competence in 3- to 16-year-old children (Goodman, 2001). It has shown good reliability and validity internationally, including samples collected in Nordic countries (Borg et al., 2014; Koskelainen et al., 2000; Obel et al., 2004). The 25-item questionnaire comprises the main scale of total difficulties (20 items), which, in turn, consists of the subscales of emotional symptoms, conduct problems, hyperactivity/inattention and peer relationship problems, each rated based on 5 items. The measure also includes a scale of prosocial behavior, referring to the positive development of social–emotional skills (5 items).

The parents rate each item on a scale from 0 to 2. These ratings are then summed up to mean sum scores, with sum scores ranging from 0–10 for the subscales and 0–40 for the total social–emotional symptoms score. Higher scores reflect more symptoms, except for the prosocial scale, where higher scores reflect higher prosocial behavior. The international cut-offs for clinically significant difficulties are >16 for total symptoms, >3 for behavioral symptoms, >4 for emotional symptoms, >3 for peer problems and <7 for prosocial behaviors (Goodman, 2001). Most scales showed satisfactory or good internal consistency in the samples of the current study (Cronbach's alpha for total symptoms = .78–.81 in mothers and = .74–.81 in fathers, for externalizing symptoms = .66–.72 in mothers and = .65–.77 in fathers, for hyperactivity/inattention symptoms = .77–.83 for mothers and = .71–.78 in fathers and for prosocial behaviors = .68–.74 in mothers and .61–.72 in fathers), with the exceptions of internalizing symptoms and peer relationship problems that showed rather low internal consistency (α for internalizing symptoms = .49–.62 in mothers and .45–.72 in fathers and for peer problems = .45–.58 in mothers and .40–.50 in fathers). Similar consistencies, with some subscales showing lower reliability, have been reported previously in Nordic samples studying the psychometric properties of the SDQ (Smedje et al., 1999).

Child sleep symptoms

Child sleep symptoms were measured using 6 items from the Disorders of Initiating and Maintaining Sleep Scale (DIMS) from

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Table 1. The sociodemographic characteristics of the families ($N = 1825$) in the study

	M (SD), range	no. (%)	M (SD), range	no. (%)
Child information	Mother reports[a]		Father reports[a]	
Reports available (at least one time point)		1,707 (94)		849 (47)
at 4 years of age		1,134		566
at 5 years of age		1,506		718
T1		613		159
T2		489		129
T3		421		118
T5		323		88
Born < 37 gestational weeks		79 (5)		43 (5)
APGAR at 5 minutes ≤ 6		29 (2)		17 (2)
Child biological sex, girl		783 (46)		397 (47)
Child age				
at 4 years of age	4.5(0.7), 4.0-8.2		4.5(0.7), 4.0-7.5	
at 5 years of age	5.3(0.6), 4.6-8.5		5.2(0.4), 4.5-7.9	
T1	6.3(0.9), 4.4-8.9		6.3(1.0), 4.5-8.6	
T2	6.7(0.9), 4.7-9.3		6.5(0.9), 4.9-8.6	
T3	6.9(0.9), 5.1-9.0		6.8(0.9), 5.1-8.7	
T5	7.3(0.9), 5.6-9.0		7.4(0.8), 5.6-8.9	
Parental information	**Mothers**		**Fathers**	
Education				
High school, secondary vocational or less		484 (28)		293 (35)
Tertiary vocational		483 (28)		245 (29)
University degree		662 (39)		263 (31)
Missing		78 (5)		48 (6)
EPDS Depressive symptoms				
at 4 years of age	4.9(4.4), 0–26		4.2(4.2), 0–23	
at 5 years of age	5.1(4.6), 0–26		4.1(4.1), 0–23	
T1	7.1(4.9), 0–24		5.5(4.1), 0–18	
T2	5.6(4.5), 0–23		4.5(4.6), 0–19	
T3	7.0(5.1), 0–23		5.6(4.8), 0–19	
T5	5.5(4.8), 0–25		3.5(3.5), 0–16	
SCL-90 Anxiety symptoms				
at 4 years of child's age	3.4(4.5), 0–32		2.8(3.8), 0–30	
at 5 years of child's age	4.1(5.0), 0–37		3.0(3.9), 0–29	
T1	5.2(5.2), 0–29		3.6(4.6), 0–29	
T2	4.1(4.6), 0–26		3.0(4.2), 0–27	
T3	5.1(5.4), 0–29		3.5(4.5), 0–28	
T5	4.2(4.8), 0–24		2.2(3.2), 0–14	
COVID-related stressors				
T1	4.6(2.9), 0–15		4.2(2.8), 0–14	
T2	2.6(2.3), 0–11		2.1(2.1), 0–10	
T3	7.9(3.1), 0–18		7.1(3.3), 0–16	
T5	7.5(3.3), 0–18		6.6(3.4), 0–15	

(*Continued*)

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Table 1. (*Continued*)

	M (SD), range	no. (%)	M (SD), range	no. (%)
Negative life events unrelated to pandemic				
T1	0.5(0.9), 0–5		0.5(0.8), 0–5	
T2	0.3(0.7), 0–4		0.3(0.6), 0–4	
T3	0.3(0.6), 0–4		0.2(0.6), 0–4	
T5	0.2(0.4), 0–2		0.1(0.3), 0–1	

Note. EPDS = Edinburgh Postnatal Depression Scale; SCL-90 = Symptom Checklist-90; T1 = 11th May 2020, T2 = 1st September 2020, T3 = 16th December 2020, T5 = 23th June 2021.
[a]There were N = 731 families where both parents that had reported child symptoms at any time point (regardless of the time point). Furthermore, by single time points, there were N = 432 (at 4 years, t0a), N = 602 (at 5 years, t0b), N = 77 (T1), N = 56 (T2), N = 48 (T3), N = 26 (T5) reports from both parents.

the Sleep Disturbance Scale for Children (Bruni et al., 1996). Sleep Disturbance Scale for Children has shown good psychometric properties and validity, and the DIMS subscale has shown good or adequate internal consistency in previous studies (Marriner et al., 2017), also including a Finnish sample (Simola et al., 2010). The following items were rated on a scale from 1 to 5 and summed up to a one-child sleep problems scale where higher scores indicated greater sleep problems: "How many hours of sleep does your child get on most nights?", "The child goes to bed reluctantly," "The child has difficulty getting to sleep at night," "The child feels anxious and afraid when falling asleep," "The child wakes up more than twice per night" and "After waking up in the night, child has difficulty fall asleep again." The sleep score showed satisfactory internal consistency in the samples of the present study (Cronbach's alpha = .61 to .65 for mothers and .66 to .69 for fathers), with the exception of summer 2021 for mothers and summer 2020 for fathers ($\alpha = .56$ for both). However, since the scale measures the number of sleep symptoms that do not need to be correlated to indicate a possible sleep disturbance (WHO, 2004), and a removal of any item did not increase the internal consistency of the scale, the scale was used as such in the following analyses.

Parental Distress: depressive and anxiety symptoms

Parental depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987) which has shown good reliability and validity in both mothers and fathers (Eberhard-Gran et al., 2001; Matthey et al., 2001). This scale was used to measure parental depression in the baseline Birth Cohort study and was chosen to study depression longitudinally pre-pandemic to pandemic. The questionnaire was completed by both parents at each COVID follow-up time point. The EPDS comprises 10 items, each rated from 0 to 3, resulting in a maximum score of 30, with 10 or greater indicating possible depression. The EPDS items are not specific to the pre- or postnatal period and can also be used during other periods (see the sample items in the Appendix).

Parental anxiety symptoms were assessed using the 10-item anxiety subscale from the Symptom Checklist −90 (SCL-90) questionnaire, which is a validated measure for the evaluation of anxiety in clinical and research settings (Derogatis et al., 1973; Holi, 2003). The items of SCL-90 are responded to on a scale from 0 to 5, with the sum ranging from 0 to 50.

Both measures showed good internal consistency in the current samples. Alphas for mothers ranged from .85 to .88 for both the EPDS and the SCL-90. In fathers, alphas ranged from .80 to .89 and .84 to .89 for the EPDS and SCL-90, respectively. The descriptive statistics for parental and anxiety symptoms are reported in Table 1.

COVID-related stressors

The COVID-19-related stressful life events (CovEvents) were assessed in T1–T5, employing a questionnaire with a "yes" or "no" answer for each item based on the experiences of the respondents, which is based on the assessment of SARS-related stressors in a study by Main et al. (2011). The questionnaire covered the following events: health events related to self, family members, friends and relatives or acquaintances (e.g., showing COVID-like symptoms, receiving treatment with or without hospitalization because of the coronavirus); free time restrictions (e.g., living in an area that was isolated, having to give up important activities or hobbies due to COVID-19); and economic difficulties (e.g., getting laid off from work, deterioration of personal or spouse's economic situation due to the pandemic). The sum of all these events was used in the current study. The COVID-19 stressors were measured slightly differently in T2, asking only about the health events; in the current study, the sums at each time point were thus standardized before inclusion in the analysis.

Covariates

Negative life events (LifeNeg) unrelated to the pandemic were reported at each pandemic time point (T1–T5) by asking about life events (e.g., moving to another place, death of a relative, divorce) and asking the parents to rate the negativity or positivity of each event on a scale from 0 to 2 (0 = neutral, 1 = somewhat negative/positive, 2 = very negative/positive). The events rated negative were summed up to a count of negative events during the past year (at T1) or during the past two to three months (T2, T3 and T5). The analyses were controlled for child biological sex (binary, retrieved from the national birth registry data gathered after the child was born, www.thl.fi), rater parent (mother vs. father/spouse or parent who did not give birth), parental education (1 = high school or secondary vocational education, 2 = vocational tertiary education, 3 = university education) and estimated school attendance. School attendance was estimated based on the age of >7 years during the index year, for example, children 7 years or older during 2020 started school in August 2020.

Statistical analyses

The analyses were conducted using R 4.0.5 (R Core Team, 2021). The mixed models were fitted using the lmer function in the R package lme4 (Bates et al., 2015). First, we analyzed how child

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Table 2. Descriptive information on child social–emotional and sleep symptoms across the follow-up

	M(SD), range	M(SD), range
Child symptoms	Mother reports	Father reports
SDQ total social–emotional symptoms		
T0a	9.18(4.69), 0–28	9.75(4.48), 0–26
T0b	8.87(5.01), 0–29	9.56(4.81), 0–26
T1	9.10(5.19), 0–28.25	9.43(4.72), 1–21.6
T2	8.11(4.94), 0–31	8.61(4.39), 0–20
T3	8.07(5.12), 0–25	8.89(4.96), 0–23
T5	7.93(4.83), 0–26	8.44(5.08), 0–26
SDQ F1 emotional symptoms		
T0a	1.08(1.22), 0–9	1.08(1.13), 0–6
T0b	1.25(1.35), 0–8	1.19(1.22), 0–6
T1	1.45(1.54), 0–9	1.31(1.46), 0–7
T2	1.25(1.44), 0–9	1.20(1.25), 0–6
T3	1.30(1.43), 0–8	1.37(1.42), 0–7
T5	1.23(1.48), 0–10	1.42(1.65), 0–7
SDQ F2 conduct problems		
T0a	3.05(1.90), 0–10	3.12(1.92), 0–10
T0b	2.82(2.01), 0–10	2.95(1.93), 0–10
T1	3.00(2.09), 0–10	2.77(1.96), 0–9
T2	2.56(1.86), 0–9	2.49(1.78), 0–7
T3	2.57(1.90), 0–9	2.56(1.99), 0–10
T5	2.60(1.86), 0–8	2.35(2.02), 0–8
SDQ F3 hyperactivity/inattention		
T0a	3.15(2.17), 0–10	3.46(2.03), 0–10
T0b	3.20(2.34), 0–10	3.60(2.33), 0–10
T1	3.23(2.37), 0–10	3.46(2.27), 0–10
T2	2.92(2.35), 0–10	3.17(2.20), 0–9
T3	2.89(2.49), 0–10	3.35(2.37), 0–10
T5	2.77(2.37), 0–10	3.06(2.44), 0–10
SDQ F4 peer relationship problems		
T0a	1.89(1.55), 0–9	2.10(1.50), 0–9
T0b	1.60(1.52), 0–9	1.83(1.41), 0–8
T1	1.45(1.45), 0–8	1.88(1.39), 0–6.7
T2	1.38(1.34), 0–7	1.73(1.42), 0–7
T3	1.32(1.39), 0–7	1.62(1.44), 0–6
T5	1.32(1.44), 0–8	1.62(1.32), 0–6
SDQ F5 prosocial behaviors		
T0a	7.15(1.86), 1–10	7.03(1.81), 0–10
T0b	7.32(1.93), 0–10	7.24(1.84), 0–10
T1	7.62(1.83), 1–10	7.51(1.70), 1–10
T2	7.72(1.79), 2–10	7.73(1.62), 4–10
T3	7.81(1.76), 1–10	7.84(1.84), 3.8–10
T5	7.78(1.86), 2–10	8.14(1.64), 3.8–10
SDSC/DIMS sleep symptoms		
T0a	4.00(2.57), 0–15	
T0b	3.75(2.50), 0–16	

(*Continued*)

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Table 2. (*Continued*)

	M(SD), range	M(SD), range
T1	3.40(2.62), 0–15	3.22(2.52), 0–11
T2	3.28(2.36), 0–14	3.18(2.35), 0–12
T3	3.22(2.54), 0–12	3.21(2.62), 0–12
T5	3.14(2.31), 0–11	3.11(2.44), 0–12

Note. SDQ = Strengths and Difficulties Questionnaire, SDSC = Sleep Disturbance Scale for Children, DIMS = Difficulties in initiating and maintaining sleep T0a =, T0b =, T1 = 11 May 2020, T2 = 1September 2020, T3 = December 2020, T5 = 23th June 2021.

social–emotional symptoms (based on the SDQ) and sleep problems evolved before and during the COVID-19 pandemic using the following mixed model:

$$\begin{aligned} Model\ 1:\ & SDQ/Sleep \\ & \sim Intercept + DateTerms + Sex + AgeTerms + School \\ & + Parent + Education \\ & + (Intercept + Date + Parent)/Childalign* \end{aligned}$$

where SDQ/Sleep, the response variable, means either Sleep sum score, SDQ sum score or one of its factors. DateTerms refers to terms of the piecewise linear function that was used to model the (continuous) questionnaire answering date. The breakpoints, that is, where the line was allowed to turn (break), were at 28 February 2020 (T0), 11 May 2020 (T1), 1 September 2020 (T2), 16 December 2020 (T3) and 23 June 2021 (T5). That is, we modeled the time dependency of SDQ/Sleep using a piecewise linear function, that is, line(s), that was allowed to break at the above-mentioned timepoints. This is best illustrated by Figure 1 in the main text. The cut point dates for T1–T5 were selected as the median answer dates for each time point. AgeTerms refers to a piecewise linear function that was used to model child age at the questionnaire answering date. The cut points were at 5, 6 and 7 years. In parentheses are the random effects, that is, the individual terms for each child. Date is a linear date term that allows the directions of the individual trajectories to vary. As there were insufficient data, this term was omitted when the Sleep sum score was analyzed.

Second, we tested how parental stress (based on the EPDS or SCL) was associated with SDQ and sleep at each time point and how these associations evolved (before and) during the pandemic. We used the following mixed model:

$$\begin{aligned} Model\ 2:\ & SDQ/Sleep \\ & \sim Intercept + DateTerms + Distress \\ & + DateTerms\ x\ Distress + Sex + AgeTerms + School \\ & + Parent + Education \\ & + (Intercept + Date + Parent)/Childalign* \end{aligned}$$

where Distress is either parental EPDS or SCL. That is, Distress and the interaction DateTerms x Distress were added to Model 1. The estimates for the associations between EPDS/SCL and SDQ/Sleep at each time point (T0, T1, T2, T3 and T5) were calculated by forming the needed linear combinations of the terms in the model.

Third, to examine how COVID-related stressors were related to SDQ and sleep, we used the following mixed models:

$$\begin{aligned} Model\ 3a:\ & SDQ/Sleep \\ & \sim Intercept + DateTerms' + CovEvents \\ & + DateTerms'\ x\ CovEvents + Sex + AgeTerms \\ & + School + Parent + Education \\ & + (Intercept)/Childcommaandalign* \end{aligned}$$

$$\begin{aligned} Model\ 3b\ :\ & SDQ/Sleep \\ & \sim Intercept + DateTerms' + CovEvents + LifeNeg \\ & + EPDS + SCL + +\ DateTerms'\ x\ CovEvents \\ & + DateTerms'\ x\ LifeNeg + DateTerms'\ xEPDS \\ & + DateTerms'\ x\ SCL + Sex + AgeTerms + School \\ & + Parent + Education + (Intercept)/Childalign* \end{aligned}$$

where DateTerms' is the same as DateTerms in models 1 and 2, except that there was no cut point at 28 February 2020. This was because there were no data about COVID-related events from the time before the pandemic. The random intercept was the only random effect in these models, as there were insufficient data for these models to use a more complex random effect structure. Model 3b and Model 3a were thus used to estimate the associations between the stressful events and SDQ/Sleep when negative life events, EPDS and SCL at the moment of answering the questionnaire, were and were not controlled for. Here again, the estimates for the associations at each time point were calculated by forming the needed linear combinations of the terms in the model.

Finally, we conducted mediation analyses *separately at each post-COVID time point* to analyze how parental stress (either EPDS, SCL or negative life events) mediates the effect of COVID-related stressors on child symptoms (based on the SDQ/Sleep sum and DSQ factors). We only examined mediation of effects identified in the previous analysis. We used the following standard linear regression models:

$$\begin{aligned} M1:\ & PASDQ/Sleep \sim Intercept + PACovEvents + PADistress \\ & + Sex + AgeTerms + School + MomEducation \end{aligned}$$

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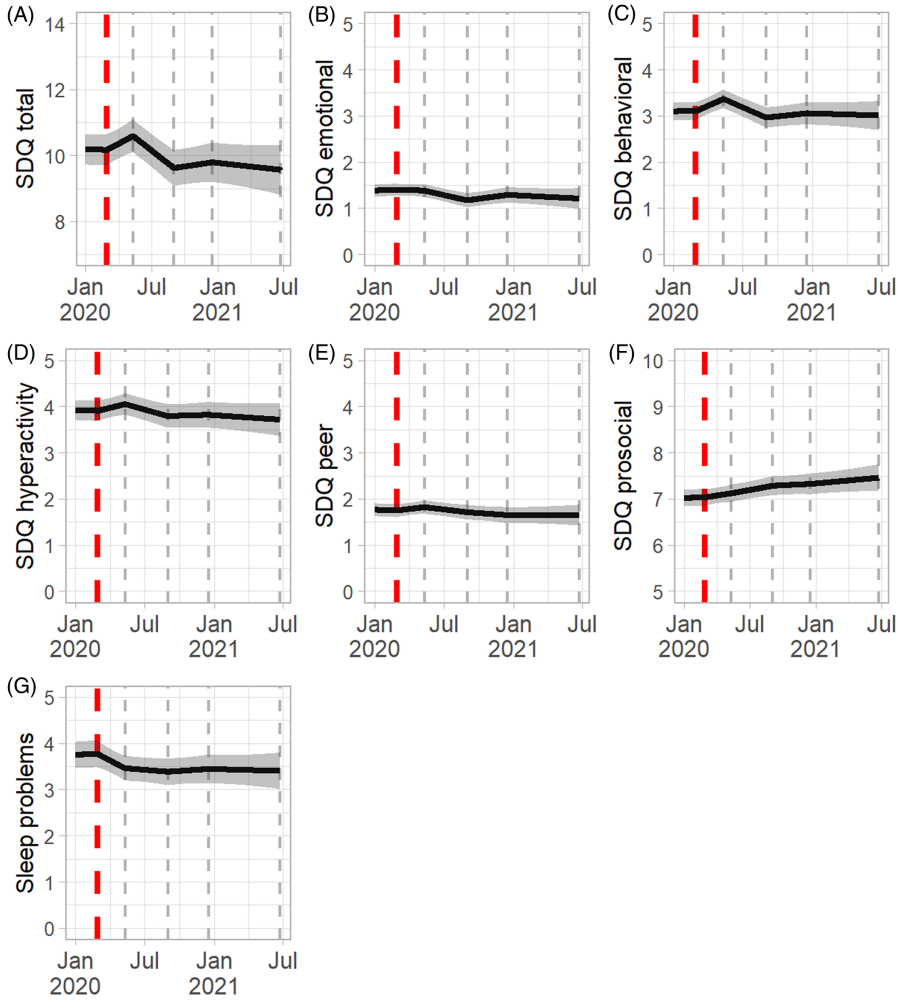

Figure 1. The change of child social–emotional symptoms (A–F) and child sleep (G) during the COVID-19 pandemic (modeled as a continuous data). The shaded areas indicate the pointwise 95% CIs. The red dashed line indicates the beginning of the pandemic.

$$M2: PADistress \sim Intercept + PACovEvents + Sex + AgeTerms + School + MomEducation$$

where *PADistress* means either EPDS, SCL or negative life events. Otherwise, the terms are as described in the previous models, with the exception that instead of having one row of data per child at each time point, we had to use the average (mean) between the mother's and father's answers for the variables related to/rated by both parents (PA = Parental Average; if only one parent's value was available, it was used instead of the mean value). Furthermore, the mother's education was used as the parent's education. These simplifications allowed us to assume the observations as mutually independent which allowed us to use the basic methods for the mediation analyses. Model M1 was used to estimate the direct effect and the effect of parental stress on child symptoms (Mediation2), while M2 was used to estimate the effect of COVID-related stressors on parental stress (Mediation1). The estimated mediation effect was then calculated as Mediation = Mediation1 × Mediation2, and BCa confidence intervals (Efron, 1987) based on 2000 bootstrap samples were calculated for the estimate. The statistical significance of the mediation was then evaluated based on the BCa confidence intervals.

Post hoc analyses

We conducted the sleep-related analyses without the item "The child feels anxious and afraid when falling asleep" to examine the independent role of other sleep symptom scale items in explaining the obtained results (versus the associations being an artifact of this item that may overlap with child psychopathology or parental distress symptoms). For social–emotional symptoms child sleep symptoms, no significant sex-by-date interactions were detected in the further analyses; thus, these analyses are not presented.

Results

Course of child social–emotional symptoms and sleep problems across COVID-19

The changes in children's social–emotional and sleep symptoms are shown in Figure 1 (A–G) and Table 3. When controlled for the covariates, children's total social–emotional symptoms increased after the beginning of the pandemic in spring 2020 (T1) and decreased thereafter from spring 2020 to August 2020 (T2). After that, social–emotional symptoms remained stable across the follow-up. A similar pattern was observed when focusing on the course of child externalizing symptoms and hyperactivity/inattention symptoms. Instead, child internalizing symptoms

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Table 3. The change of child social–emotional and sleep symptoms pre-pandemic and across the pandemic: Results of the mixed models controlled for child sex, age, school attendance, rater (parent) and parental education

	SDQ total problems				SDQ F1 emotional symptoms				SDQ F2 behavioral problems			
	Estimate	CIl	CIu	*p*	Estimate	CIl	CIu	*p*	Estimate	CIl	CIu	*p*
(Intercept)	13.96	3.56	24.35	0.008	−3.48	−6.18	−0.77	0.011	2.66	−1.55	6.87	0.215
Change												
Before T0	−0.017	−0.080	0.048	0.610	0.024	0.008	0.041	**0.003**	0.008	−0.017	0.034	0.520
T0-T1	0.584	0.072	1.097	**0.025**	−0.021	−0.198	0.157	0.822	0.366	0.137	0.594	**0.002**
T1-T2	−0.865	−1.144	−0.586	**<.001**	−0.186	−0.287	−0.086	**<0.001**	−0.361	−0.487	−0.233	**<0.001**
T2-T3	0.163	−0.148	0.473	0.301	0.110	−0.003	0.222	0.056	0.086	−0.056	0.228	0.233
T3-T5	−0.120	−0.358	0.118	0.320	−0.042	−0.127	0.043	0.334	−0.025	−0.132	0.083	0.655

	SDQ F3 Hyperactivity/inattention				SDQ F4 Peer relationship problems				SDQ F5 Prosocial behavior				Sleep symptoms			
	Estimate	CIl	CIu	p	Estimate	CIl	CIu	p	Estimate	CIl	CIu	p	Estimate	CIl	CIu	p
(Intercept)	7.58	2.73	12.44	0.002	7.33	4.06	10.61	<0.001	2.10	−1.90	6.10	0.303	−1.27	−7.20	4.67	0.68
Change																
Before T0	−0.025	−0.054	0.005	0.107	−0.026	−0.046	−0.006	**0.012**	0.027	0.003	0.052	**0.031**	0.037	0.000	0.074	**0.05**
T0-T1	0.202	−0.038	0.443	0.099	0.010	−0.080	0.281	0.275	0.119	−0.100	0.339	0.287	−0.428	−0.774	−0.082	**0.02**
T1-T2	−0.232	−0.363	−0.100	**<0.001**	−0.099	−0.200	0.003	0.057	0.143	0.020	0.266	**0.022**	−0.067	−0.244	0.111	0.46
T2-T3	0.025	−0.121	0.171	0.737	−0.059	−0.172	0.054	0.307	0.038	−0.099	0.175	0.586	0.056	−0.141	0.253	0.58
T3-T5	−0.055	−0.167	0.057	0.337	−0.000	−0.086	0.085	1.00	0.071	−0.032	0.175	0.176	−0.022	−0.167	0.123	0.77

Note. T0 = 28th February 2020, T1 = 11th May 2020, T2 = 1st September 2020, T3 = 16th December 2020, T5 = 23th June 2021. All models were controlled for child sex, age, rater parent (mother/father), school attendance and parental education. Significant associations are bolded. The estimates of change describe the change in symptom scores per 100 days. CIl = confidence interval lower, CIu = confidence interval upper.

increased before the pandemic and were thus independent of it and decreased from spring 2020 to August 2020 (T2). Peer relationship problems decreased before the pandemic, but no significant changes were observed during the pandemic. Finally, child prosocial skills improved before the pandemic and continued to improve during summer 2020 (T1–T2), independent of child age.

Child sleep symptoms increased before the pandemic and decreased during the beginning of the pandemic (T1), after which no significant changes were observed. Post hoc analyses indicated that the change was most strongly driven by a decrease in the item "child wakes up more than twice per night" (Estimate = −1.69 [−2.78, −0.61], p = .002) (see Supplement).

Parental depressive symptoms and child social–emotional and sleep symptoms during pandemic

Level of parental depressive symptoms and level of child symptoms

When the covariates were controlled for, parental depressive symptoms were significantly associated with child total social–emotional and externalizing symptoms cross-sectionally at each time point during the COVID pandemic (see Figure 2). However, parental depressive symptoms were no longer significantly associated with child hyperactivity/inattention problems, internalizing symptoms or prosocial behavior in summer 2021 ($p < 0.16$). Finally, parental depressive symptoms were not related to child peer relationship problems at the end of the follow-up in March 2021 ($p = 0.14$) or in summer 2021 ($p = 0.054$). A similar pattern was observed relative to child sleep symptoms: parental depressive symptoms were associated with child sleep symptoms across the follow-up period (estimates = 0.05–0.10, ps <.001) except in summer 2021 (estimate = 0.02, p = .37).

Association between parental depressive symptoms and child social–emotional and sleep symptoms

Between the beginning of the pandemic and summer 2021, the positive association between parental depressive symptoms and child total social–emotional (estimate = −0.10 [−0.20, −0.01), $p = 0.033$) and internalizing problems (estimate = −0.04 [−0.07, −0.003], $p = 0.032$) as well as sleep symptoms (estimate = −0.07 [−0.13, −0.02], p = .014) weakened.

Parental anxiety symptoms and child social–emotional symptoms and sleep during pandemic

Level of parental symptoms and child symptoms

Parental anxiety symptoms were significantly associated with child total social–emotional and externalizing and hyperactivity/inattention symptoms cross-sectionally at each time point (see Figure 2) (ps < 0.03). The level of parental anxiety was related to internalizing symptoms and peer relationship problems at all time points except in summer 2021 (T5) ($p = 0.10$). For prosocial behaviors, parental level of anxiety remained significantly associated, except for T3 (December 2020) ($p = 0.63$). Parental anxiety symptoms were associated with child sleep problems at each time point (estimate = 0.06–0.10, ps <.012).

The association between parental symptoms and child social–emotional symptoms/sleep

Between the beginning of the pandemic and summer 2021, the positive association between parental anxiety symptoms and child internalizing symptoms diminished (estimate = −0.04 [−0.08, −0.01), $p = 0.006$). No significant change in the strength of association was observed in terms of other symptom domains.

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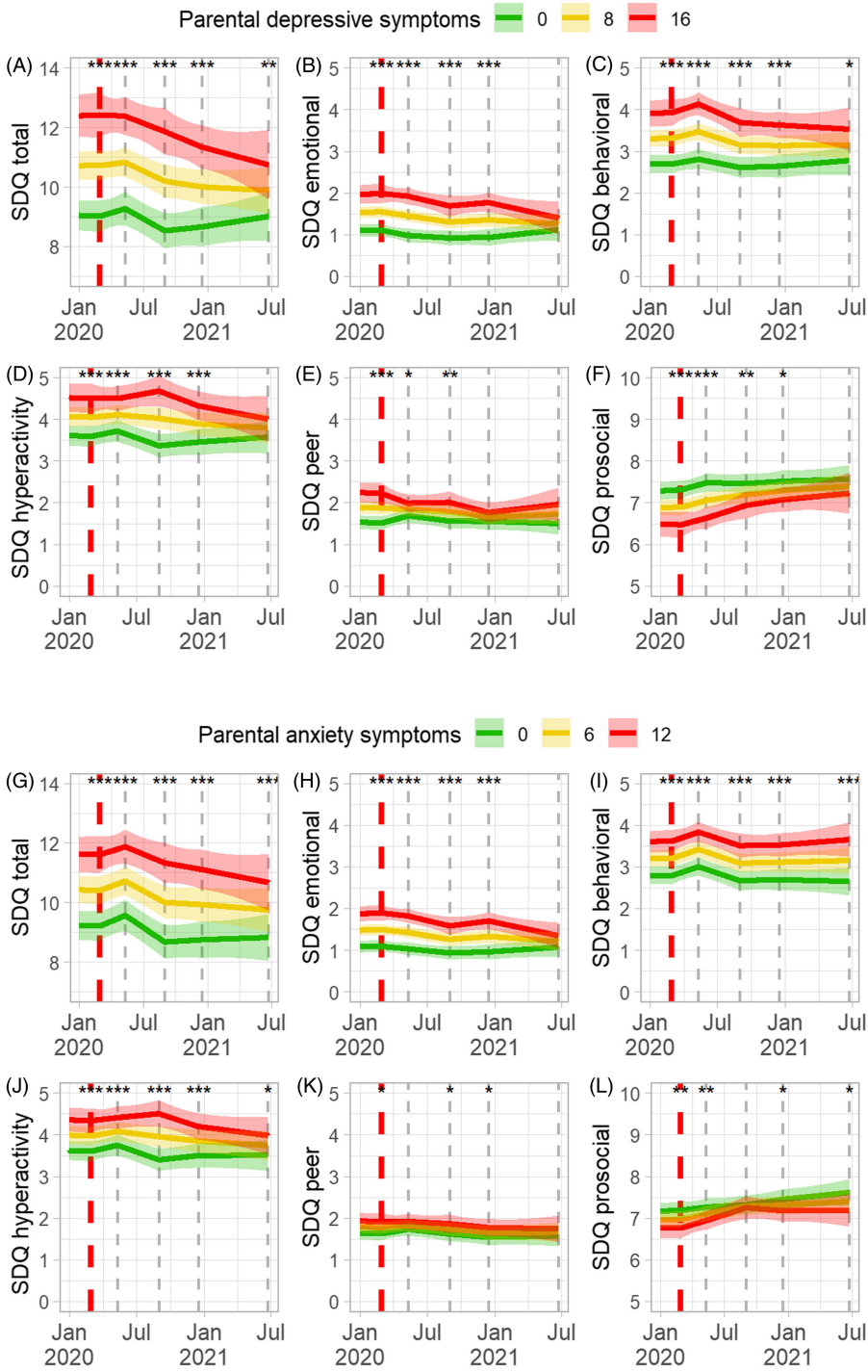

Figure 2. Child symptoms at selected levels of parental depressive and anxiety across pandemic. The results are based on the mixed models. Note that parental symptoms are modeled as a continuous variable but only three selected values are shown to make the visualization possible. The other covariates are fixed at their mean/mode values. The stars indicate the statistical significance of the association between parental symptoms and child psychiatric symptoms at each timepoint (* p <.05, ** p <.01, *** p <.001). The shaded areas indicate the pointwise 95% CIs. The red dashed line indicates the beginning of the pandemic.

COVID-related stressors and child social–emotional symptoms and sleep

After controlling for covariates, the number of COVID stressful life events was associated with more child total social–emotional symptoms in December 2020 (estimate = 0.36, $p = 0.011$) and hyperactivity/inattention symptoms in December 2020 (estimate = 0.16, $p = 0.017$) (Table 4). No other cross-sectional associations were observed. These associations remained significant when controlling for negative life events in the family, but when controlling for parental distress (depressive and/or anxiety symptoms), the association between COVID-related stressors and child symptoms diminished (Table 4). A mediation analysis indicated that the association between COVID-related stressors and child total social–emotional symptoms in December 2020 was mediated by parental depressive (B = 0.14 [95% CI_{bc} 0.08, 0.22]) and anxiety symptoms (B = 0.14 [95% CI_{bc} = 0.09, 0.23]). Similarly, the association between COVID-related stressors and child hyperactivity/inattention symptoms in December 2020 was mediated by parental depressive and anxiety symptoms (B = 0.05 [95% CI_{bc} = 0.03, 0.08] for both mediators).

The number of COVID-related stressors was directly related to more sleep symptoms in spring 2020 (T1) (estimate = 0.21,

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Table 4. The association between COVID-related stressors and cross-sectional child social-emotional and sleep symptoms across the follow-up directly (Model 1), and when corrected for parental depressive and anxiety symptoms (Model 2)

	T1 (May 2020)		T2 (Aug 2020)		T3 (Dec 2020)		T5 (June 2021)	
Estimates (95% CI)								
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
SDQ total	0.16 (−0.16, 0.47)	−0.00 (−0.31, 0.31)	0.20 (−0.08, 0.47)	0.09 (−0.19, 0.36)	0.36* (0.08, 0.63)[a]	0.15 (−0.13, 0.44)	0.04 (−0.34, 0.42)	0.01 (−0.37, 0.39)
Emotional	0.04 (−0.06, 0.15)	−0.02 (−0.13, 0.09)	0.09 (0.09, −0.01)	0.06 (−0.04, 0.16)	0.06 (−0.03, 0.16)	−0.01 (−0.11, 0.09)	0.04 (−0.10, 0.18)	0.03 (−0.10, 0.17)
Behavioral	0.11 (−0.02, 0.24)	0.06 (−0.07, 0.19)	0.06 (−0.06, 0.18)	0.03 (−0.09, 0.14)	0.09 (−0.03, 0.21)	0.02 (−0.18, 0.13)	0.02 (−0.15, 0.18)	−0.02 (−0.18, 0.13)
Hyper/att	0.06 (−0.04, 0.22)	0.01 (−0.14, 0.16)	0.09 (−0.04, 0.22)	0.05 (−0.08, 0.18)	0.16* (0.03, 0.29)[a]	0.09 (−0.05, 0.22)	−0.07 (−0.25, 0.11)	−0.06 (−0.24, 0.12)
Peer	−0.03 (0.13, 0.07)	−0.04 (−0.15, 0.06)	−0.02 (−0.11, 0.08)	−0.04 (−0.15, 0.06)	−0.05 (−0.016, 0.07)	0.04 (−0.13, 0.06)	0.04 (−0.09, 0.16)	0.04 (−0.06, 0.14)
Prosocial	−0.02 (−0.15, 0.10)	0.02 (−0.11, 0.06)	−0.05 (−0.16, 0.07)	−0.05 (−0.16, 0.06)	−0.08 (−0.19, 0.04)	−0.07 (−0.18, 0.05)	0.05 (−0.11, 0.21)	0.05 (−0.10, 0.20)
Sleep	0.21* (0.04, 0.38)[a]	0.12 (−0.05, 0.30)	0.11 (−0.05, 0.27)	0.08 (−0.08, 0.24)	0.16* (0.00, 0.32)[a]	0.08 −0.08, 0.24)	0.13 (−0.09, 0.38)	0.12 (−0.10, 0.34)

Note. p <0.05; Model1 = controlled for child age, child sex, estimated school attendance, parental education and parental gender; Model 2 = additionally controlled for negative life events unrelated to pandemic and parental depressive and anxiety symptoms. Results remained similar when only parental depressive or anxiety symptoms were included in the model 2. Hyper/att = hyperactivity and attention problems, Peer = peer relationship problems. Significant associations are bolded.
[a]The statistically significant main effects on child outcomes were significantly mediated through parental depressive and anxiety symptoms in separate, cross-sectional mediation analysis (see manuscript text).

p = .016) and in December 2020 (T3) (estimate = 0.16, p = .047) (Table 4). The effect sizes diminished remarkably when controlling for parental distress in the model. Associations at both time points were mediated by parental depressive and anxiety symptoms (B = 0.04 [95% CI = 0.02, 0.06] for both mediators at T1; B = 0.03 [95% = 0.01, 0.06] for both mediators at T3).

Post hoc analyses

The sensitivity analyses, in which the item describing anxiety before going to sleep was removed from the sleep symptoms score, showed identical results to the original analyses.

Discussion

In this study, we found that in Finnish children aged 4 to 9 years belonging to a general population sample, child total social–emotional and especially externalizing symptoms increased at the beginning of the pandemic but decreased to pre-pandemic levels thereafter and remained stable throughout the rest of the follow-up. Sleep symptoms showed some decrease at the beginning of the pandemic and remained stable thereafter. Parental distress was concurrently linked with child social–emotional and sleep symptoms, but surprisingly, higher parental distress was longitudinally linked with decreasing child social–emotional and sleep symptoms. Finally, COVID-related stressors were not associated with child symptoms when parental distress was considered; instead, our findings based on cross-sectional analysis suggested that parental distress may mediate the association between COVID stressors and child outcomes at specific time points where the direct effect of COVID stressors was detected. The findings offer completely novel insights into long-term child social–emotional and sleep outcomes during the pandemic, extending to 2021.

First, we observed a pattern of changes at the beginning of the pandemic. Child total social–emotional symptoms increased at the beginning of the pandemic but decreased thereafter. This pattern of change was primarily related to a change in externalizing symptoms, as the internalizing symptoms had decreased before the pandemic and thus no pandemic-related change was observed. This is in line with the findings of Raw et al. (2021), who reported an increase in externalizing symptoms in a UK sample. However, the findings deviate from meta-analytical studies suggesting that internalizing-type symptoms also peaked as a response during the pandemic (Bignardi et al., 2021; Feinberg et al., 2021; Ma et al., 2021; Racine et al., 2021; Spencer et al., 2021). A rise in externalizing symptoms may reflect children's and families' initial reactivity to the pandemic and related uncertainty. On the other hand, the externalizing symptoms may also have been reported more frequently by parents who were more often at home with their children and thus may have observed a higher frequency of behavioral problems in comparison to baseline.

In terms of child sleep, a pattern more comparable to internalizing symptoms was detected. Our findings suggest that sleep symptoms may have increased before the pandemic; however, they showed some decline at the beginning of the pandemic. These findings are in line with the study of Dellagiulia et al. (2020), who also reported a decrease in sleep symptoms in 3–6-year-old children, an age group that partially overlapped with the sample of the present study. However, the common finding in prior studies was an increase in sleep symptoms along with child age, with the exception of infants (Sharma et al., 2021).

Taken together, based on our sample of 5- to 9-year-olds, there is little evidence of a longitudinal increase in social–emotional or

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sleep symptoms. This interpretation is also warranted, keeping in mind that we performed many statistical comparisons for several subscales; however, the significant decrease in social–emotional symptoms in summer 2020 and no increase thereafter was one of the most robust results observed in the current study. The differences between the studies may be related to the age of the participants, as an increase in internalizing symptoms was especially prevalent in adolescents (Ma et al., 2021; Racine et al., 2021). However, another explanation for this pattern of results could be related to the differences in the manifestation of the pandemic and the related measures and restrictions over different countries. In an international comparison, Finland had fewer positive COVID-19 cases and hospitalized patients until late 2021, which was also reflected in the less stringent measures, including a short period of school closures and basically no closures for school grades 1–3 (children age 9 and younger) or for daycare centers. However, the local measures were most fully in action in spring 2020 (lockdown and strict remote work instructions and closure of schools for children older than age 9) and from December 2020 to June 2021 (closure of free time activities, strong remote work recommendations), which correspond to the time points included in this study (Hale et al., 2021; Ritchie et al., 2020). The results may indicate that the mental health of children younger than age 10 can be protected from the possibly adverse influences of pandemics if the restrictions concerning schools and daycare are kept flexible. However, the role of societal factors in explaining parental and child well-being during the pandemic should be further investigated to understand the inconsistencies in the current research. Finally, other possible moderators, such as a child's and family's resilience factors, should be given more attention in future research.

The current study also observed some potentially positive changes in child outcomes, although many of these changes were weaker in comparison to the main patterns of results observed. Lessened sleep symptoms may be linked with the changes in everyday practices brought about by COVID restrictions; parental remote work and the closing of daycare/schools likely affected sleep–wake rhythms in families, possibly allowing them to sleep in accordance with their innate circadian rhythm, which may improve sleep quality. Moreover, young children may have an increased sense of security when their parents are at home during the daytime which may decrease the prevalence of sleep problems. This explanation is strengthened by the observation that the pattern of results was primarily related to the decrease in frequency of child night-time awakenings. Child prosocial behavior also seemed to improve during the pandemic after controlling for child age. It is possible that the pandemic provided an opportunity for, on average, more sleep (Camacho-Montaño et al., 2022; Illingworth et al., 2022) and thus fewer sleep problems in younger children, which may be an underlying link between the positive changes in social–emotional development observed in this study. In the sample of the current study, we were not able to test this hypothesis due to the nature of the item measuring child sleep duration, which is not able to detect fine-grained changes in sleep duration (e.g., additional minutes of sleep). More detailed studies, preferably those utilizing experimental methods to characterize sleep duration and linking that to the prospective social–emotional functioning of the child, should be conducted to confirm this hypothesis.

Next, expectedly, higher parental depressive and anxiety symptoms were linked with more child social–emotional and sleep symptoms throughout most of the follow-up period. This is in line with prior studies on social–emotional outcomes (Davidson et al., 2021; Feinberg et al., 2021; Frigerio et al., 2022; Giannotti et al., 2021; Kerr et al., 2021; Liu et al., 2021; Martiny et al., 2021; McArthur et al., 2021; Moulin et al., 2021; Saddik et al., 2021) and child sleep symptoms (Cellini et al., 2021; Markovic et al., 2021; Zreik et al., 2021). Prior studies primarily focused on the beginning of the pandemic; our findings indicate that the same pattern continued when the pandemic was extended. It was also observed that the number of COVID-related stressful events was related to child total social–emotional and sleep symptoms in early (spring 2020) and mid-pandemic (December 2020), but the associations disappeared when controlling for concurrent parental distress and thus, may be mediated by parental well-being. Detecting an association at these specific time points corresponds to those points of the pandemic when there were (i) most worries related to the outbreak of the pandemic and (ii) the restrictions were most stringent, with the population still in the process of adapting to the situation (in comparison to the later stages of the pandemic when the situation had become more normal). The findings also indicate that children are at different risk for social–emotional and sleep symptoms based on their parents' well-being. In line with previous studies underscoring the role of parental resilience (Pugliese et al., 2022; Sorkkila & Aunola, 2022), our findings underscore the role of parental well-being as the "modifiable" source of risk for child development and, crucially, warrants services oriented to support families and parents in the pandemic milieu and during its aftermath.

However, we must note that the mediation analysis was based on cross-sectional data, leaving open the possibility that child symptoms may also mediate the association between COVID-related stressors and parental symptoms. Furthermore, since there were several tests concerning different time points – an approach justified by the lack of previous research and the varying course of the pandemic over the follow-up period, and the fact that most of the comparisons resulted from the use of subscales that were part of the SDQ total problems scale – further studies would be needed to confirm these findings.

Interestingly, towards the end of the follow-up, the associations between parental distress and child outcomes diminished. There may be two explanations for this finding. First, there was attrition in the follow-up, which may have resulted in less variation in parental and child symptoms at the end of the follow-up. However, it may be that some families and children can also benefit from the drastic change in everyday life caused by the pandemic (Bruining et al., 2020; Cost et al., 2022; Pugliese et al., 2022; Sorkkila & Aunola, 2022). In the same vein, recent studies have also reported that the role of socioeconomic status in moderating adolescent psychopathology has diminished during the pandemic versus prior to the pandemic (Koenig et al., 2021). Consequently, the pandemic may have also made room for positive changes in the family, regardless of high parental distress. However, the finding is preliminary, and future studies may need to test whether such observations would be true in other data sets and longitudinal follow-ups. This study does not extend to the post-pandemic period, which emphasizes the need for additional long-term studies on the topic.

The main strengths of the current study include longitudinal follow-up with comparison data from the pre-pandemic period with variations in child age, enabling continuous control for child age, as well as the use of both maternal and paternal reports in the models. The clear limitations include the use of only parental reports of both parental and child symptoms and COVID-related stressors, thus increasing the possibility of reporter bias. Another

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limitation lies in the diminishing sample size and thus statistical power over the follow-up; however, the repeated measures design partially compensates for this limitation. The follow-up comprised several points that we wanted to examine separately based on the varying course of the pandemic, but there are several findings that would need confirmation in future studies. For instance, the heterogeneity in the child and parental symptom trajectories and their interrelations would be an important follow-up analysis for future studies. The findings of the current study are derived from a general population sample showing, on average, relatively low levels of parental and child symptoms, and the generalizability to clinical populations is limited. One limitation concerning the interpretation of sleep findings is that, since only six items from the original DIMS scale (including seven items) were used to assess sleep symptoms, the levels of sleep symptoms obtained cannot be directly compared to previous similar studies. Additionally, some of the scales for both social–emotional and sleep symptoms showed rather low internal consistency in the sample of the current study. Similar findings have been reported previously, with the recommendation that the measures be used in their original form (Smedje et al., 1999). Furthermore, the problem may derive from the age range of the current study, with an emphasis on younger participants (Mieloo et al., 2012).

To conclude, the current study reported longitudinal child social–emotional and sleep symptoms from pre-pandemic to summer 2021. Our findings point to little or no longitudinal increase in child social–emotional symptoms and, surprisingly, a longitudinally stable decrease in sleep symptoms. The findings also emphasize the role of parental distress in explaining child symptomatology although the role of parental distress weakened over the pandemic. More longitudinal studies of child well-being across societies with different courses of pandemic restrictions are needed to better understand and promote the modulators of child well-being during global crises.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0954579422001377

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