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ORIGINAL PAPER

Post-Traumatic Stress Symptoms in Parents and Parent-Reported Child Mental Health during the COVID-19 Pandemic: A Cross-Sectional Survey

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Abstract

Pandemics such as the COVID-19 pandemic can cause stress and psychopathological symptoms, particularly in parents and families. To date, few studies have examined post-traumatic stress symptoms (PTSS) before and during the pandemic in parents and related risk factors as well as associations with children's psychological symptoms. Therefore, in this cross-sectional online study parents ($N = 670$, 90% female, $M = 38.5$, $SD = 6.5$) were asked about their own psychopathological symptoms (anxiety, depression, PTSS; current and retrospective) and their children's psychological symptoms. Results showed that parents report most strongly PTSS symptoms during the pandemic compared to pre-pandemic retrospective recall ($d = 0.84$; anxiety and depression $d \leq 0.63$), with parents observing emotional symptoms in their children in particular ($d = 0.46$, other domains $d \leq 31$). While 11.8% of parents reported elevated scores for PTSS before the pandemic, 22.7% did so during the pandemic. Between child and parental psychopathology, the strongest associations were found between child emotional problems and parental PTSS, anxiety, and depression ($r \geq 0.36$). Depressive symptoms and PTSS before the pandemic accounted for incremental variance in PTSS during the pandemic (in addition to sociodemographic variables and stress level during the pandemic). The findings suggest that the COVID-19 pandemic may also represent a traumatic event and parental PTSS may be significantly related to child stress, implying special consideration of family/family dynamics in times of crisis.

Keywords Child and adolescents · COVID-19 · parents · PTSD · stress

Highlights

- Stronger parental post-traumatic stress symptoms (PTSS) during the pandemic than before (11.8% vs. 22.7%)
- Significant links between parental PTSS, anxiety, and depression and child emotional problems during the pandemic
- Pre-pandemic depression and PTSS explain incremental variance in PTSS during the pandemic

Pandemics such as the COVID-19 pandemic are particularly stressful events that can have a significant impact on mental health and can trigger psychopathological symptoms (Cooke et al., 2020; Pierce et al., 2020; Wang et al., 2020). In international studies among the general population, up to 35% of respondents reported increased psychological stress, up to 50% anxiety symptoms, and up to 54% depressive symptoms during the COVID-19 pandemic (Chi et al., 2020; Huang & Zhao, 2020; Karatzias et al., 2020; Qiu et al., 2020; Rossi et al., 2020; Wang et al., 2020). Due to critical changes in life (e.g., lockdown, existential fears due to the threat of unemployment), increased morbidity and mortality caused by SARS-CoV-2, and the resulting uncontrollability and helplessness, the pandemic may be a traumatic event and accompanied by symptoms of Post-traumatic Stress Disorder (PTSD) (Cooke et al., 2020; Kaubisch et al., 2022; Sohrabi et al., 2020). In previous studies in the general population and student samples, up to one-third of participants reported PTSD symptoms and 7% of participants in a region particularly affected by COVID-

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19 (Wuhan, China) met the criteria for a PTSD according to the DSM-5 (Chi et al., 2020; Karatzias et al., 2020; Liu et al., 2020; Rossi et al., 2020). Recent meta-analyses (Cooke et al., 2020; Yunitri et al., 2022) found a pooled prevalence rate of 18% for at least indicating PTSD (cut-off reached in a questionnaire or diagnosis) and 24% for PTSD symptoms during the COVID-19 pandemic. According to the DSM-5 (American Psychiatric Association, 2013), the diagnostic criteria for PTSD are: a person has been directly or indirectly confronted with a traumatic event (e.g., serious accident or witnessing a death) and symptoms of re-experiencing, avoidance, negative thoughts/feelings, and hyperarousal have persisted for at least one month. The term post-traumatic stress symptoms (PTSS) usually refer to a direct or indirect confrontation with a traumatic event and at least one symptom from the above-mentioned domains of PTSD. As PTSS are usually chronic and associated with severe impairments in daily life, which can also have a negative impact on family communication and the child's mental health (Hosman et al., 2009; Prime et al., 2020), PTSS require particular research interest, especiallyPlease check and confirm that the authors names (first and surname)/order of authors/affiliation have been identified correctly in times of crisis (Kaubisch et al., 2022).

Previous studies have shown that women, young, and middle-aged adults, as well as people with (younger) children, are particularly likely to experience psychological symptoms and distress during the COVID-19 pandemic (Huang & Zhao, 2020; Lauri Korajlija & Jokic-Begic, 2020; Moghanibashi-Mansourieh, 2020; Pierce et al., 2020). These findings are consistent with some recent studies that increasingly recognize the high burden on parents/caregivers and their families during the pandemic (Di Giorgio et al., 2021; Ebrahim et al., 2020; Russell et al., 2020; Spinelli et al., 2020). Models such as the Transgenerational Transmission of Psychopathology Model (Hosman et al., 2009) and the Family Stress Model (Conger et al., 2010) postulate that parental mental health in interaction with characteristics of the environment and parent-child interactions significantly influences family well-being and child mental health. Specifically related to the COVID-19 pandemic, Prime et al. (2020) developed a framework model to explain worsened mental health of parents as well as children/adolescents during the COVID-19 pandemic. The pandemic leads to stresses and constraints in social and environmental conditions (e.g., financial insecurity, social distancing/isolation) that may have a direct negative impact on children's mental health, but also a negative impact on the mental health of parents (who, as described above, are a vulnerable group who develop psychopathological symptoms). Parental mental health problems (e.g., psychopathological symptoms) can adversely affect family climate and parent-child interactions, which in turn can lead to child mental health problems (e.g., emotional and behavioral problems) (Prime et al., 2020). Parents showed increased levels of psychosocial stress during the pandemic, especially due to the multiple strains (e.g., work, homeschooling during the 2020 lockdown, concerns about children's health, academic, and social functioning and, worries about family financial needs), which can subsequently negatively affect both their own and their children's mental health (via family dynamics, parent-child relationships) (Brown et al., 2020; Fegert et al., 2020; Hankin & Abela, 2005; Hosman et al., 2009; Russell et al., 2020; Spina et al., 2023). In addition to these mostly psychosocial stressors, there were potentially traumatic medical events (e.g., severe illness, hospitalization, death), especially during the COVID-19 pandemic, which can lead to traumatic stress for individuals (e.g., parents, children) and for the family as a whole (Kazak et al., 2021).

Compared to the enormous increase in publications on the psychological impact of the COVID-19 pandemic, few studies have focused on parents and their children, and on the relationship between parental and child psychopathology. Di Giorgio et al. (2021) found that mothers reported a significant deterioration in sleep quality and emotional symptoms (e.g., frustration and sadness) during the pandemic when compared with the period before. Concerning their children (2–5 years), they reported a significant increase in emotional symptoms, conduct problems, and hyperactivity/inattention. There were significant correlations between parents' and children's poor sleep quality and between parents' psychological symptoms and children's sleep problems (Di Giorgio et al., 2021). In another Italian study during the COVID-19 pandemic, significant positive associations were found between parent-perceived stress levels and parent-reported emotional and conduct problems as well as hyperactivity/inattention in their children (2–14 years) (Spinelli et al., 2020).

Post-traumatic stress symptoms (PTSS) are associated with particularly high levels of distress and impairments in daily life, and parental PTSD has found to be particularly negatively associated with child mental health (Selimbasic et al., 2012; Sprang & Silman, 2013). During a previous pandemic, Sprang & Silman (2013) found that 25% of quarantined or isolated parents and 30% of quarantined or isolated children (parent report) suffer from clinically relevant PTSD symptoms. Of the parents who met criteria for PTSD, 86% of their children also met the PTSD cut-off (Sprang & Silman, 2013). Concerning the COVID-19 pandemic there are hardly any studies that have specifically investigated PTSD symptoms in parents and associations with the mental health of their children. Loret de Mola et al. (2021) surveyed mothers in 2019 (before pandemic, $N = 2051$) about depressive and anxiety symptoms and from May to July 2020 (during pandemic, $n = 1064$) about

depressive, anxiety, and additionally (their own) stress caused by traumatic events (Impact of Events Scale, IES; Weiss & Marmar, 1997). Anxiety (2.4-fold) and depressive symptoms (5.7-fold) showed significant increases from 2019 to 2020 ($p < 0.001$). 40.5% of mothers reported moderate to severe stress symptoms due to the COVID-19 pandemic in 2020, with mothers being particularly stressed if they were over 25 years old, at least one family member worked outside the home, and family income had decreased since the pandemic began. Crescentini et al. (2020) found that 27% of parents ($N = 721$) reported moderate-to-severe PTSS (IES) during the COVID-19 pandemic. Internalizing symptoms increased significantly in both parents and children from pre- (retrospectively assessed) to during the pandemic, and significant associations were found between parental and child internalizing symptoms (ß ≥ 0.35).

In the context of the pandemic as a potentially traumatic experience, the study of PTSS in families is of great importance. As described above, PTSD is a mental disorder that is associated with particularly severe distress and impairments in everyday life and, if left untreated, often takes a chronic course (Hyland et al., 2020; Kessler, 2000). This, probably does not only concern the individual level of the affected parent, psychopathological symptoms of the parents can also impact the whole family and children in various ways (e.g., communication, parent-child interaction and relationship, model/social learning, underlying beliefs about the world; Hosman et al., 2009; Prime et al., 2020). However, few studies have looked at psychological symptoms/disorders in families and in particular PTSD in parents and links with children's mental health during the COVID-19 pandemic (Kaubisch et al., 2022). The few studies were conducted, for example, in more specific settings (particularly affected areas) or with a specific focus (e.g., parents, internalizing symptoms in children; Crescentini et al., 2020; Loret de Mola et al., 2021). Therefore, the aim of the present study was to investigate the extent to which parents suffered from PTSS during the pandemic and the interactions between parental and child psychopathology in a general population. This includes studying the impact of the COVID-19 pandemic in terms of PTSS in families by examining risk factors for parental PTSS and comparing parental PTSS and child psychopathology before and during the pandemic. This research aims to contribute to a better understanding of pandemics as traumatic experiences and their impact on mental health. The results can help to identify vulnerability factors and interactions between psychopathologies in parents and children in order to better recognize them in the future and intervene at an early stage (e.g., prevention to support families with vulnerability factors or interrupting unfavorable vicious cycles).

In the present study, it was expected that compared to pre-pandemic levels, parents' anxiety, depression, and PTSS increased significantly since the COVID-19 pandemic (with the increase in PTSS being moderated by the magnitude of stressors). Based on previous studies (Di Giorgio et al., 2021), we expected a significant increase in emotional problems, conduct problems, and hyperactivity/inattention in children. Regarding associations between parental PTSS and children's psychopathology, we expected moderately strong positive associations between parental PTSS and emotional problems in children during the pandemic (based on previous findings). Because preexisting trauma, as well as preexisting emotional symptoms (anxiety and depressive symptoms), are risk factors for the development of PTSD (Heron-Delaney et al., 2013; Lee & First, 2022), we expected that pre-pandemic PTSS, anxiety, and depressive symptoms may explain significant incremental variance of PTSS during the pandemic (in addition to sociodemographic variables and stress level during the pandemic). As the pre-pandemic characteristics were difficult to obtain from suitable pre-pandemic studies and the time for a longitudinal study (beginning before the pandemic) had passed, the pre-pandemic parameters were surveyed retrospectively as part of a cross-sectional study.

Participants and Methods

Participants

The inclusion criteria were an age of at least 18 years and living together at least with one child under the age of 18 years (there were no explicit exclusion criteria; except that a dropout due to the study information was considered a withdrawal of consent).

A power analysis showed that a sample size of at least $N = 88$ is required to achieve a medium effect (related to correlation: G*Power, $\rho = 0.30$, $\alpha = 0.05$, Power (1-β) = 0.90, lower for moderation and MANOVA). The plan was to keep the study online until the end of the semester (July 15, 2020) to reach this sample size. A total of $N = 674$ parents (one parent per family) fully completed the study. Four participants were excluded because they entered the number of children aged under 18 as "0" resulting in a final sample of $N = 670$. Sociodemographic characteristics of parents and their children are shown in Table 1.

Procedure

The cross-sectional online survey "How do you feel as parents during the coronavirus pandemic?" was conducted between 19 May and 15 July 2020 (via SoSci Survey, Leiner, 2024). Parents from the German general population were recruited via press releases (print, online, local, and national), social media (e.g., Facebook, Twitter, parent-

Table 1 Sociodemographic characteristics of parents and their families ($N = 670$)

	N	%	*M*	*SD*
Parents				
Age (in years)			38.5	6.5
Sex (female)[a]	606	90.4		
Country of birth: Germany[b]	627	93.6		
Marital status				
single	36	5.4		
relationship/married	585	87.3		
separated/divorced	48	7.2		
widowed	1	0.1		
Education (% higher education)	552	82.4		
Occupation				
unemployed	11	1.6		
in training	19	2.8		
student	33	4.9		
employee	419	62.5		
self-employed occupation	38	5.7		
housewife/-husband	32	4.8		
on parental leave	73	10.9		
retired	8	1.2		
others	37	5.5		
Family income				
<900 €	7	1.0		
900–<1300€	20	3.0		
1300–<1500€	23	3.4		
1500–<2000€	32	4.8		
2000–<2600€	61	9.1		
2600–<3600€	128	19.1		
3600–<5000€	205	30.6		
≥5000€	140	20.9		
no information	54	8.1		
Children				
Number children per family			1.8	0.8
Age (in years)			6.7	4.6
Sex (female)	539	45.6		

[a]diverse $N = 4$ (0.6%)

[b]further country of birth *N* (%): Poland 7 (1%), Austria 4 (0.6%), Kyrgyzstan 4 (0.6%), Italy 3 (0.4%), Kazakhstan 3 (0.4%), Ukraine 3 (0.4%), Russia 2 (0.3%), Australia 1 (0.1%), Belarus 1 (0.1%), Bosnia 1 (0.1%), Brazil 1 (0.1%), Bulgaria 1 (0.1%), Colombia 1 (0.1%), Croatia 1 (0.1%), France 1 (0.1%), Greece 1 (0.1%), India 1(0.1%), Iran 1 (0.1%), Latvia 1 (0.1%), Romania 1 (0.1%), Slovakia 1 (0.1%), South Africa 1 (0.1%), Switzerland 1 (0.1%), USA 1 (0.1%)

child forums), kindergartens and schools, and our department's website. After informed consent, the parents completed socio-demographic data and the questionnaires (see below). As an expense allowance, participants had the opportunity to take part in a lottery for 3 × 20€ gift vouchers. Psychology students could receive a certificate for 0.5 course credits. The study protocol was approved by the local ethics committee of the Department of Psychology.

Measures

The three questionnaires listed below were presented twice for assessing parents' and children's wellbeing and psychological symptoms before (i.e., retrospectively surveyed before/the end of January 2020) and during (i.e., since the end of January/particularly since March 2020) the COVID-19 pandemic.

Parental Posttraumatic Stress Disorder Symptoms

The German version of the Short Screening Scale for PTSD (Breslau et al., 1999; Siegrist & Maercker, 2010) uses seven items to assess two symptom cluster of PTSD: a) avoidance and numbing (5 items) and b) hyperarousal (2 items). The answers are given on a four-point Likert scale (1 = "not at all" to 4 = "four times a week/most of the time"). Assessing PTSD symptoms during the pandemic, we slightly modified the items so that the traumatic event refers to the pandemic (e.g., "Did you avoid being reminded of the current pandemic by staying away from certain places, people, or activities?"). The Short Screening-Scale for PTSD is a highly reliable instrument and showed high correlations ($r = 0.90$, $p < 0.01$) with symptom scores assessed by the Structured Clinical Interview-I for DSM-IV (Menning et al., 2008; Wittchen et al., 1997). In our study, the internal consistencies were $\omega = 0.93$ (before COVID-19) and $\omega = 0.78$ (during COVID-19). The cut-off (elevated PTSS or evidence of a PTSD diagnosis) is met when at least 4 of the 7 symptoms are present at least 2–4 times per week (3rd of 4th response levels).

Parental Anxiety and Depression Symptoms

The Patient Health Questionnaire for Depression and Anxiety (PHQ–4) is a four-item ultra-brief screening tool for depression and anxiety (Kroenke et al., 2009) and consists of the 2-item depression scale (PHQ-2) (Kroenke et al., 2003) and the 2-item anxiety scale (GAD-2) (Kroenke et al., 2007). For depression, the core symptoms "depressed mood" and "lost of interest" are captured while for anxiety the instrument focuses on feeling nervous/anxious and not being able to control worrying. The response options range from 0 ("not at all") to 3 ("nearly every day"). The German version of the PHQ-4 can reliably and validly measure depression and anxiety (Kroenke et al., 2009; Löwe et al., 2010). In the present study, the internal consistencies were $\omega = 0.75$ (before) and $\omega = 0.80$ (during the pandemic) for the depression subscale and $\omega = 0.75$ (before) and $\omega = 0.82$ (during the pandemic) for the anxiety subscale.

Children's Psychological Problems

The German version of the Strengths and Difficulties Questionnaire (SDQ-German) (Goodman, 1997; Klasen et al., 2003) was used in the parent version. Parents rate 25 items on mental health problems as how strongly these characteristics describe their children (from 0 = "not at all" to 2 = "certainly"). Five items each cover the following subscales: Emotional symptoms, conduct problems, hyperactivity/inattention, peer problems, and prosocial behaviors. The present study focused on the first four subscales. Reliability and validity of the SDQ has been confirmed in several studies (Rothenberger et al., 2008; Woerner et al., 2004). In this study, the internal consistencies were $\omega = 0.71$ (before)/0.82 (during the pandemic) for the subscale emotional problems, $\omega = 0.54/0.62$ for conduct problems, $\omega = 0.81/0.83$ for hyperactivity/inattention, and $\omega = 0.67/0.66$ for peer problems.

Further Question on Stress Factors during the Covid-19 Pandemic

Parents were asked which factors burden them most during the pandemic (any number of 12 specifications could be selected: e.g. work situation, financial worries, double burden of work and children, psychological burden of children, … plus 'others' with an open format.).

Study Context

The survey took place at a time during the first wave of the pandemic (19 May and 15 July 2020) when the number of active SARS-CoV-2 infections in Germany was declined (compared to March 2020). On 19 May 2020, the beginning of the survey, 175,210 infections were confirmed in Germany, including approximately 155,700 recovered cases (Robert Koch Institute, 2020a). During the survey period, the number of new infections had decreased in Germany, with 199,726 confirmed cases including 186,000 recovered cases at the end of the survey (Robert Koch Institute, 2020b).

Statistical Analyses

Statistical analyses were carried out with SPSS 23.0 (IBM Corp., 2015), including the PROCESS macros for McDonald's omega and moderation analysis (Hayes, 2017; Hayes & Coutts, 2020). Due to the study information and the possibility of discontinuing the study (dropout equates to withdrawal of consent), only complete data was included in the data analysis. The online survey was programmed in such a way that no items could be skipped, so that there was no missing data. Comparing the psychopathology before and during the pandemic in parents and children, two repeated measures MANOVAs were calculated: 2 (time) x 3 (depression, anxiety, and PTSS) MANOVA for parents and a 2 (time) x 4 (hyperactivity/inattention, emotional, conduct, and peer problems) MANOVA for children. Since the psychopathology variables were not normally distributed, Spearman's correlation coefficients were calculated for relationships. For the regression analysis, first multicollinearity was checked (correlations of the predictors were each below $r = 0.70$; Tabachnick & Fidell, 1996). In the regression analysis, the dependent variable was the parental PTSS sum score during the pandemic; parental sex (female and male, as diverse with 0.6% too few), age, and family income were entered in Step 1, the degree of burden during the pandemic (i.e., the number of specifications, such as concerns about children, work situation) in Step 2, and the parental psychopathology before the pandemic (anxiety, depression, and PTSS) in Step 3.

Results

Descriptive Statistics

Table 2 shows the mean values and standard deviations of the psychopathological characteristics of parents and children (PTSD screening, PHQ-4, and SDQ) as well as the stated stress factors of parents during the pandemic. We also asked parents about their professional situation and how it had changed since the COVID-19 pandemic: 34.8% reported no change, 28.5% were now completely working from home, 14.0% were mainly working from home, 10.1% were occasionally working from home, 4.6% were on leave (currently not working), 4.4% were receiving financial compensation due to absence, and 4.3% were working reduced hours.

Before the pandemic, 11.8% of parents exceeded the cut-off in PTSD screening; during the pandemic, 22.7% of parents. In the multiple choice (and "other") selection of the strongest stressors, parents reported an average of $M = 4.41$ ($SD = 2.07$) different stressors. The three most frequently mentioned stress factors were: Lack of social contacts of the children (81.5%), double burden of work and children (61.2%), and lack of own social contacts (61.0%).

Psychopathological symptoms (depression, anxiety, and PTSS) of parents before the pandemic correlated between $r = 0.18$ and $r = 0.59$ ($p < 0.001$), and during the pandemic between $r = 0.55$ and $r = 0.70$ ($p < 0.001$). Pre-pandemic and during-pandemic data regarding parental psychopathology correlated between $r = 0.16$ ($p < 0.001$; PTSS before and during) and $r = 0.65$ ($p < 0.001$; anxiety before and during the pandemic). For children, mental health problem areas before the pandemic correlated between

Table 2 Mean sum scores (*M*) and standard deviations (*SD*) of the psychopathological characteristics of parents and children before and during the pandemic and the stated stress factors of parents during the pandemic ($N = 670$)

	M	*SD*	*N*	%[a]
Parents				
Depressive symptoms $_{before}$	1.48	1.16		
Depressive symptoms $_{during}$	2.33	1.50		
Anxiety symptoms $_{before}$	1.67	1.29		
Anxiety symptoms $_{during}$	2.43	1.68		
PTSD symptoms $_{before}$	9.64	4.93		
PTSD cut-off[b] $_{before}$			79	11.8
PTSD symptoms $_{during}$	13.71	4.76		
PTSD cut-off[b] $_{during}$			152	22.7
Domains of most burden during the pandemic				
Number of domains of burden	4.41	2.07		
Work situation			261	39.0
Financial worries			131	19.6
Double burden of work and children			410	61.2
Illness and losses/deaths			68	10.1
Lack of own social contacts			409	61.0
Lack of school lessons			207	30.9
Lack of social contacts of the children			546	81.5
Own mental distress			222	33.1
Mental distress of the children			172	25.7
Poor mood in the family			245	36.6
Health anxiety			97	14.5
Worries, infecting others			96	14.3
Other			90	13.4
Children[c]				
Emotional problems $_{before}$	1.86	1.93		
Emotional problems $_{during}$	2.90	2.57		
Conduct problems $_{before}$	2.12	1.53		
Conduct problems $_{during}$	2.57	1.75		
Hyperactivity/inattention $_{before}$	3.74	2.50		
Hyperactivity/inattention $_{during}$	4.53	2.63		
Peer problems $_{before}$	1.77	1.91		
Peer problems $_{during}$	2.30	2.05		

[a]Due to multiple selection without limitation sum of all values over 100%

[b]*N* (%) that have reached the cut-off in PTSD screening and indicates the presence of a PTSD diagnosis

[c]$N = 669$

$r = 0.11$ ($p < 0.01$) and $r = 0.45$ ($p < 0.001$) and during the pandemic correlated between $r = 0.19$ ($p < 0.001$) and $r = 0.54$ ($p < 0.001$). The same problem area for children correlated between $r = 0.54$ ($p < 0.001$, emotional problems before and during the pandemic) and $r = 0.76$ ($p < 0.001$, peer problems before and during the pandemic).

Psychopathological Burden of Parents and Children before and during the Pandemic

For parents, the rMANOVA showed a significant effect of time [Wilk's $\Lambda = 0.624$, $F(1, 669) = 401.42$, $p < 0.001$, $\eta^2_p = 0.38$]. Post-hoc *t*-tests (Bonferroni corrected $p < 0.05/3$) showed that since the pandemic, depression [$t(669) = 16.50$, $p < 0.001$, $d = 0.63$], anxiety [$t(669) = 16.50$, $p < 0.001$, $d = 0.50$], and PTSS [$t(669) = 16.50$, $p < 0.001$, $d = 0.84$] significantly increased, with the increase being strongest for PTSS (see Fig. 1A). The increase in PTSS was moderated by the number of stress factors [$F(1, 666) = 16.45$, $p < 0.001$, see Fig. 1B].

In children, the rMANOVA also showed a significant effect of time [Wilk's $\Lambda = 0.76$, $F(1, 668) = 206.06$, $p < 0.001$, $\eta^2_p = 0.24$]. Post-hoc *t*-tests (Bonferroni-corrected $p < 0.05/4$) showed that since the pandemic, children's emotional problems [$t(668) = 11.91$, $p < 0.001$, $d = 0.46$], conduct problems($t(668) = 8.26$, $p < 0.001$, $d = 0.27$), hyperactivity/inattention [$t(668) = 11.05$, $p < 0.001$, $d = 0.31$], and peer problems [$t(668) = 10.23$, $p < 0.001$, $d = 0.27$] significantly increased.

Relationships between Parental and Child Psychopathology

Table 3 shows the relationships between parental and child psychopathology (PTSD screening, PHQ-4, and SDQ). During the pandemic, significant correlations were found between parental and child psychopathology, with the strongest correlations between children's emotional problems and parents' PTSS, ($r = 0.36$, $p < 0.001$), symptoms of depression ($r = 0.41$, $p < 0.001$), and anxiety ($r = 0.40$, $p < 0.001$).

Determinants of Parental PTSS during the Pandemic

In the regression analysis, age ($\beta = -0.09$, $p = 0.031$), gender ($\beta = -0.09$, $p = 0.031$; 1 = female, 2 = male), and family income ($\beta = -0.09$, $p = 0.031$) were significantly negatively associated with parental PTSS during the pandemic (Step 1: $R^2 = 0.03$, $p < 0.001$). The number of perceived burdens explained incremental variance in PTSS during the pandemic beyond socio-demographic aspects ($\beta = 0.42$, $p < 0.001$; Step 2: $\Delta R^2 = 0.18$, $p < 0.001$). Parental psychopathological characteristics before the pandemic explained variance in parental PTSS during the pandemic beyond sociodemographic aspects and the level of perceived burden (Step 3: $\Delta R^2 = 0.06$, $p < 0.001$; $R_{cor}{}^2 = 0.26$), with depression symptoms ($\beta = 0.14$, $p = 0.001$) and PTSS ($\beta = 0.13$, $p = 0.001$) before the pandemic as significant predictors.

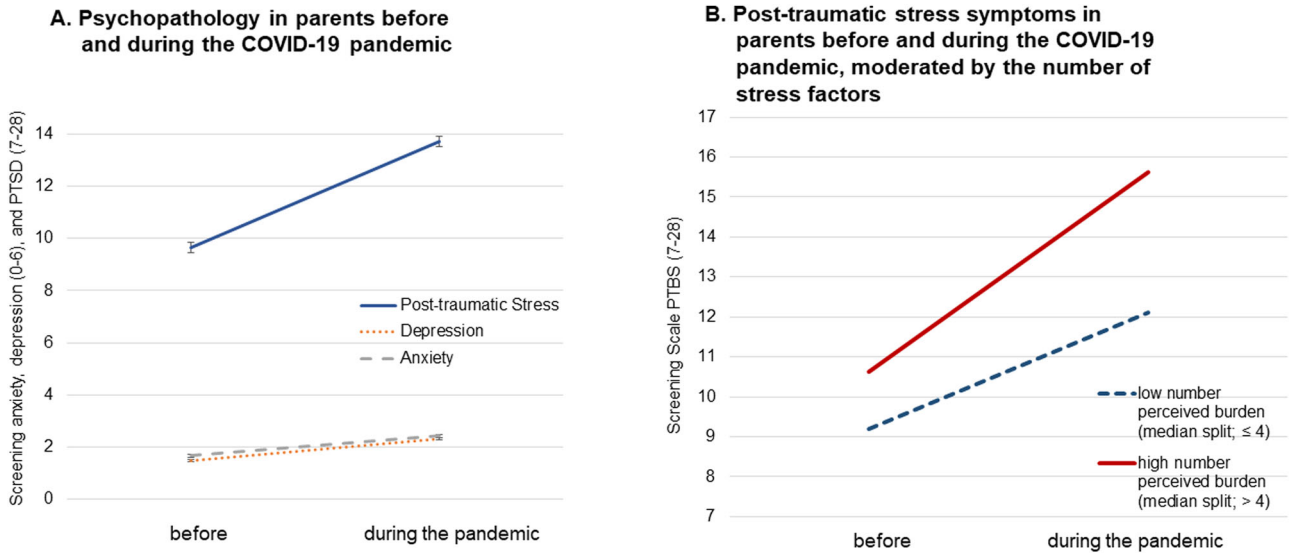

Fig. 1 Psychopathology in parents before and during the COVID-19 pandemic without (**A**; for anxiety, depression and posttraumatic stress symptoms) and with moderation (**B**; for post-traumatic stress symptoms)

Discussion

The current study aimed to examine the impact of the COVID-19 pandemic with respect to PTSS in parents, as well as possible pre-pandemic existing risk factors and associations with children's psychopathology. Most studies to date have focused on either adults/parents or children, so this is one of the few studies that also looks more systematically at the relationship between parental and child psychopathology. As in previous studies (Crescentini et al., 2020; Loret de Mola et al., 2021), we also found a significant increase in anxiety and depressive symptoms in parents from before to during the pandemic with medium-sized effects. In addition, we showed that PTSS increased significantly, with a large effect size and with a stronger increase compared to anxiety and depressive symptoms. This may support the consideration that the pandemic can be seen as a traumatic event (Kaubisch et al., 2022) and that, in particular, specific symptoms in the domain of PTSD such as hyperarousal, numbing, and avoidance can develop or be exacerbated in parents. In our study, 22.7% of parents had elevated PTSS during the pandemic, indicative of possible PTSD (no diagnosis was made here using structured or standardized clinical interviews). This is within the range of results from the general population (18–24%; Cooke et al., 2020; Yunitri et al., 2022), but lower than in other studies with parents (27–40.5%; Crescentini et al., 2020; Loret de Mola et al., 2021). However, it should be noted, that different (versions of) questionnaire instruments were used and, that the terms and concepts are not always used consistently and unambiguously (e.g., whether the occurrence of PTSS, increased values when a cut-off is reached, or the diagnosis is meant). The two studies with higher prevalence values regarding a cut-off score used the IES with the subfacets avoidance and intrusion (Loret de Mola et al., 2021) and the IES-R with avoidance, intrusion, and hyperarousal (Crescentini et al., 2020). We may have found slightly lower values because the questionnaire used here (PTSD Screening) does not ask about intrusive experiences, which are also described during the COVID-19 pandemic (Sanchez-Gomez et al., 2021). The degree of other mental health symptoms in parents (PHQ-4) and children (SDQ) are similar to other studies (Calvano et al., 2022; Vallejo-Slocker et al., 2020).

In children, emotional problems seem to be the most relevant during the pandemic, showing the strongest increases and the highest correlations with parental psychopathology. Crescentini et al. (2020) also found a significant relationship between internalizing symptoms in parents and children of similar strength. In addition, we also found significant associations between parental psychopathology and child conduct and peer problems and hyperactivity/inattention during the pandemic though the correlations were all $r \leq 0.30$. This is also consistent with the recent study by Spina et al. (2023) that found positive associations between maternal psychopathological symptoms and, in particular, children's emotional and peer problems during the COVID-19 pandemic.

In the regression analyses, first, we found negative links between age, sex, and family income and parental PTSS during the pandemic, i.e., the younger the parents and the lower the family income the stronger were PTSS in parents. Additionally, women were more affected by PTSS. Thus, regarding the associations between sociodemographic variables and psychological stress/psychopathology during the COVID-19 pandemic, our findings are consistent with

Table 3 Spearman's correlations between parental and child psychopathology ($N = 670$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Parents														
1. Depressive symptoms $_{before}$	1													
2. Depressive symptoms $_{during}$	0.57***	1												
3. Anxiety symptoms $_{before}$	0.59***	0.45***	1											
4. Anxiety symptoms $_{during}$	0.40***	0.70***	0.65***	1										
5. PTSS $_{before}$	0.18***	0.14***	0.24***	0.17***	1									
6. PTSS $_{during}$	0.29***	0.55***	0.34***	0.56***	0.16***	1								
Children														
7. Emotional problems $_{before}$	0.26***	0.14***	0.25***	0.15***	0.13**	0.11**	1							
8. Emotional problems $_{during}$	0.23***	0.41***	0.30***	0.40***	0.13**	0.36***	0.54***	1						
9. Conduct problems $_{before}$	0.20***	0.12**	0.13**	0.11**	0.02	0.05	0.23***	0.08*	1					
10. Conduct problems $_{during}$	0.15***	0.27***	0.16***	0.26***	0.01	0.22***	0.14***	0.33***	0.64***	1				
11. Hyperactivity/inattention $_{before}$	0.12**	0.15***	0.11**	0.11**	0.00	0.04	0.11**	0.07	0.45***	0.35***	1			
12. Hyperactivity/inattention $_{during}$	0.09*	0.28***	0.11**	0.24***	0.00	0.20***	0.07	0.28***	0.35***	0.54***	0.74***	1		
13. Peer problems $_{before}$	0.10**	0.05	0.08*	0.04	0.12**	0.09*	0.27***	0.08*	0.20***	0.09*	0.13**	0.07	1	
14. Peer problems $_{during}$	0.13**	0.21***	0.13**	0.18***	0.13**	0.25***	0.21***	0.21***	0.19***	0.20***	0.14***	0.19***	0.76***	1

PTSS Post-traumatic stress symptoms

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

other international studies (Huang & Zhao, 2020; Moghanibashi-Mansourieh, 2020; Pierce et al., 2020; Qiu et al., 2020; Spina et al., 2023). The importance of preexisting depressive symptoms and PTSS is indicated by the finding that these two factors explained incremental variance in PTSS during the pandemic (beyond sociodemographic variables and stress level). Also Benke et al. (2022) found that pre-pandemic depressive symptoms are a risk factor for psychopathological symptoms during the pandemic. Regarding the combination of depressive symptoms and PTSS, a recent study (Benke et al., 2022) of older adults (over 60 years of age) found that individuals with pre-pandemic comorbid PTSD and depression reported significantly more psychopathological symptoms during the pandemic. However, it must be taken into account that the total variance explanation in our study is low at 26% and that other factors that were not examined here seem to play a role. For example, previous studies found that working in a health profession or psychological variables such as feeling isolated were related to PTSS (Veldhuis et al., 2021; Yunitri et al., 2022). In addition, we hardly recorded any other life circumstances or experiences that could contribute significantly to the development of PTSD (e.g., own severe corona infection or that of relatives, death among acquaintances/family).

Limitations

Our sample is not representative because it consisted mainly of mothers with high levels of education and mostly higher family income. We tried to obtain a heterogeneous sample, but presumably mothers with a higher socioeconomic status (for various reasons, e.g., time resources, understanding of the study) are more willing to participate in studies and additional recruitment in more specific settings (e.g., certain neighborhoods) or, if necessary, prejudices against studies would have to be reduced (Jungmann et al., 2023). Considering the sociodemographic factors associated with higher psychopathology during the COVID-19 pandemic (female, lower income), this could also explain the approximately lower PTSS scores (compared to other studies). To avoid bias and, especially to take more into account the perspective of fathers, representative samples should be studied in the future. Pre-pandemic psychological symptoms were recorded retrospectively. In the context of the present research question, it was difficult to obtain comparative values for the investigated variables from pre-pandemic studies and the time to start a longitudinal study on the same sample (pre-pandemic) had passed. Retrospective recordings are subject to biases such as memory effects, upward or downward comparisons (Eisenhower et al., 2004; Finney, 1981), so our findings should be interpreted cautiously. The accuracy of retrospective reports

(e.g., of symptoms) can depend on a variety of factors such as characteristics of the psychological symptom (e.g., variability of symptoms, intensity of peak and current time), retrieval interval, affective state (e.g., tendency to overreport in negative affect), and individual trait personality characteristics (e.g., anxiety sensitivity, catastrophizing) (Van den Bergh & Walentynowicz, 2016). Most of these factors were not recorded. Assuming that negative affect was more prevalent during the pandemic, a tendency to overreport, for example, cannot be ruled out. On the one hand, the recording of past psychopathological symptoms seems to be prone to errors (Henry et al., 1994). On the other hand, the past time interval (here estimation regarding about half a year before) is rather short, as there are indications that biases increase with larger time interval (Öztaş Ayhan & Işiksal, 2005). Although a longitudinal design should be preferred, Finney (1981) showed that reliable results can be obtained even with retrospective surveys when both the status quo and the past are asked separately (as was the case in this study). No differentiation was made with regard to the people who participated at the beginning of the survey period (mid-May) and at the end (mid-July 2020), but it could be that there were distortions for various reasons (e.g., different retrospective memory bias, course and measures in the context of the COVID-19 pandemic). Overall, the period of two months can be regarded as a moderate gap in this respect and as relatively constant with regard to the measures and statistical figures on infections and recovery (see data above).

Our cross-sectional design does not allow causal inferences, for example, regarding associations between parental and child psychopathology. There are a few studies that longitudinally examined parental psychological symptoms before and during the pandemic (e.g., Loret de Mola et al., 2021), but research on the interactions between parental and child psychopathological symptoms is lacking. In the future, larger-scale epidemiological family studies could be helpful to obtain baseline rates in general and comparative data for studies in times of crisis (e.g., pandemic, war, climate change).

Implications

The investigation of risk factors highlighted, that parents with pre-existing PTSS and depressive symptoms in particular are vulnerable to PTSS during the pandemic. Therefore, it is important to recognize this vulnerability (e.g., screening) and provide appropriate supports (even before pandemics). Awareness should also be raised that viral pandemics can be a traumatic experience and can trigger or exacerbate PTSS, so PTSS should be inquired about, and timely support offered to prevent the risk of chronicity. In addition to disorder-specific interventions, a holistic, multidimensional approach is recommended, especially in times of crisis (e.g., including occupational, financial, and social situations; Veldhuis et al., 2021). Prevention and intervention should take place at the individual level (parents and children for each) as well as at the family level. On the symptom level during the pandemic, our study particularly shows starting points in the area of emotional symptoms in children and avoidance, numbing, and hyperarousal (PTSS) in parents. Although, as mentioned, our study does not allow for causal conclusions (parent-child interactions), it has generally been shown that an improvement in parental well-being has a beneficial effect on family interaction and child mental health (Gunlicks & Weissman, 2008; Kerns et al., 2014). Regarding parent-child interaction, a study during the pandemic was able to show that open parent-child communication, compassion, and self-disclosure favorably impact adolescent psychopathology (Zhen et al., 2022).

Conclusion

The COVID-19 pandemic can be a traumatic experience and is particularly challenging for families. Parents reported an increase in psychopathological symptoms, particularly PTSS, during the pandemic compared with before the pandemic. One in four to five parents reported elevated PTSS levels, and parental PTSS was particularly correlated with child emotional symptoms. Pre-pandemic depressive and PTSS appear to be a risk factor for PTSS during the pandemic and could therefore be important starting points for preventing a further deterioration in mental health at an individual and family level. Because PTSS are usually chronic and associated with severe impairments in daily life (including e.g., family communication and child mental health), PTSS should receive special attention and affected individuals should be offered early support, such as early identification, psychoeducation, low-threshold prevention and intervention programs, and, if diagnosed with PTSD, psychotherapy.

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