Original article

From the beginning to 2023; did the COVID-19 pandemic affect the anxiety of parents and preschool children equally over the time?

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ABSTRACT

Background. The COVID-19 pandemic is perceived as a major threat to health and the economy worldwide, and its effects have been ongoing for about five years. Studies were generally conducted in the early stages of the pandemic, and usually included adults or adolescents. Studies examining the impact of the pandemic on preschool children (3-6 years old) are quite scarce. This study aimed to evaluate the perceived anxiety levels of children aged 3 to 6 years and their parents, focusing on anxiety-related behavioral patterns in children and the frequency of anxiety-related expressions. The assessment was conducted at four distinct time points over four years following the onset of the COVID-19 pandemic.

Method. This descriptive-cross-sectional study was conducted between May 17, 2020 and October 30, 2023. An online questionnaire form was used at four different time points.

Results. 3732 parents with children aged 3-6 participated in the study. Children's anxiety-related behaviors and expressions were more frequent during the first and second time points. Anxiety-related behaviors were more common in children during the long-term bans.

Conclusion. Perceived anxiety levels of the children aged 3-6 years at different time points during COVID-19 pandemic reflected the epidemic trends of the disease and parental anxiety levels. Understanding how the effects are distributed is important for the future.

Keywords: COVID-19; child; parent; anxiety.

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INTRODUCTION

The COVID-19 pandemic prompted rapid, fluctuating public health responses worldwide, including the imposition, relaxation, and reimplementation of restrictions to curb the spread of the virus and its variants.[1] Among the populations most profoundly affected by these measures were young children aged 3 to 6, for whom social interaction and play are critical components of healthy development.[2-4] Prolonged periods of social distancing, restricted peer interaction, and limited access to outdoor environments posed significant psychosocial challenges for this age group. Such constraints have been reported to cause confusion, fear, and distress in young children, potentially leading to heightened anxiety responses.[5-7]

To systematically monitor national-level restrictions, the Oxford Coronavirus Government Response Tracker (OxCGRT) developed the Stringency Index, which was calculated for nearly three years. This index averaged nine key indicators (ranging from school and business closures to travel bans and public information campaigns) on a scale from 0 to 100, with higher scores denoting more stringent measures.[1,8] In Türkiye, these stringent measures resulted in partial school access for about 1.5 years, while some children engaged in online learning for up to 2.5 years. These disruptions, combined with the loss of loved ones and limited opportunities for social and recreational engagement, presented considerable developmental, emotional, and mental health risks for young children.[9-11]

Understanding how children have responded to the pandemic's evolving context is essential to addressing their current and future needs effectively. However, most empirical studies during the pandemic have primarily focused on adults and adolescents, and those involving children have often grouped a wide age range (0–18 years), thereby neglecting the specific experiences of early childhood.[5,12,13] Moreover, existing research has largely concentrated on the early and middle phases of the pandemic, with limited attention to the long-term psychological impacts on young children.[14]

This study aimed to examine how perceived anxiety levels in children aged 3–6 and their parents evolved throughout the pandemic. It also explored children's anxiety-related behaviors and expressions over time. Tracking these trends may inform healthcare professionals and policymakers involved in pediatric mental health monitoring and intervention planning.

MATERIALS AND METHODS
Research design

This study is a descriptive-cross-sectional study and was conducted between May 17, 2020 and October 30, 2023 with data collection on 4 different time points. Permission for the study was obtained from the Ministry of Health of the Republic of Türkiye, and ethical approval was obtained from the Akdeniz University Faculty of Medicine Clinical Studies Ethics Committee (Decision No: KAEK-368).

Data collection

Due to the closure of health clinics, schools, and curfews in the early pandemic phase, online surveys were employed and continued for consistency post-restrictions. Data were collected from parents across Türkiye at four time points over four years (*Figure 1*): (1) May–June 2020, two months after the first reported case; (2) February–March 2021, during the second wave with high restrictions (stringency index ≈80) and adult vaccination onset; (3) September–October 2022, when restrictions were mostly lifted (index ≈11) and in-person schooling resumed; and (4) September–October 2023, one year post-restriction (index = 0). At each stage, parents of children aged 3–6 were recruited via social media, messaging apps, school parent groups, and e-mail.

Data were collected at four time points using a cross-sectional design, with different participants at each stage. This approach enabled the assessment of temporal trends in population-level prevalence without requiring the tracking of individual changes over time.

Calculating the sample size

The study population comprised approximately 3 million children aged 3–6 in Turkey. Using a 90% confidence level, 5% margin of error, and an estimated population proportion of 10%, the minimum required sample per period was 99. The actual sample sizes exceeded this threshold: 1216, 1786, 133, and 597 participants at time points 1 through 4, respectively. These yielded margins of error of ±1.69, ±1.39, ±5.10, and ±2.41 at a 95% confidence level.

Content of the survey

The survey included items on sociodemographic characteristics, parental self-rated anxiety, perceived child anxiety, anxiety-related child behaviors, and child-expressed phrases. Parents rated their own and their child's

anxiety on a 0–10 scale, with 0 indicating no anxiety and 10 indicating extreme anxiety. This numerical rating scale, validated by Crandall et al., is commonly used in related studies.[15,16]

Statistical analysis

Data were analyzed using SPSS 22. Descriptive statistics included frequency, percentage, mean, and standard deviation. Normality was assessed via histogram, Q-Q plots, skewness, kurtosis, and the Shapiro-Wilk test. For two-group comparisons, the independent samples t-test was used for normally distributed data, and the Mann-Whitney U test was used for non-normally distributed data. One-way ANOVA was used for comparisons involving three or more groups. Categorical variables were analyzed using the chi-square test; Pearson's chi-square was applied when fewer than 20% of cells had expected counts below five; otherwise, Fisher's exact test was used. Statistical significance was set at p <0.05.

RESULTS

A total of 4548 parents completed the online survey. Exclusions were made for those with chronic conditions (self or child), children outside the age range, or duplicate entries, resulting in 3732 valid responses. Participant numbers at the 1st, 2nd, 3rd, and 4th time points were 1216, 1786, 133, and 597, respectively (*Figure 2*). Most respondents were mothers (88.2%), with fathers comprising 11%, and 0.8% not disclosing gender.

Children's mean age was 4.76 ± 0.97 years; 51% were boys. A majority of mothers (57.4%) and fathers (59.2%) had high school education or less. Most children (86.8%) lived in nuclear families. While 60.4% of mothers were not employed, only 1% of fathers were. Sociodemographic details are in *Table 1*.

TABLE 1. Characteristics of participants

Variable	Survey respondents N (%)
Parent	
Mother	3292 (88.2)
Father	409 (11)
Child's age	
3	497 (13.3)
4	827 (22.2)
5	1486 (39.8)
6	922 (24.7)
Children's gender	
Girl	1828 (49)
Boy	1904 (51)
Mother's education level	
High school or less	2141 (57.4)
University	1591 (42.6)
Father's education level	
High school or less	2208 (59.2)
University	1524 (40.8)
Family type	
Nuclear family	3241 (86.8)
Extended family	491 (13.2)
Mother's working status	
Working	1478 (39.6)
Not working	2251 (60.4)
Father's working status	
Working	3692 (99)
Not working	38 (1)
Economic level	
Income is less than expenses	1250 (33.5)
Income and expense are in balance	1983 (53.1)
Income exceeds expenses	491 (13.2)
Is there a relative who died due to Covid-19?	
Yes	416 (11.1)
No	3316 (88.9)

Parents were asked to rate the level of anxiety they felt about themselves and their children from 0 (no anxiety) to 10 (highest level of anxiety). According to the parents, the average anxiety level of the children among all participants was 4.50 (SD = 3.14; 95% CI: 4.40–4.60), while it was 4.22 (SD = 3; 95% CI: 4.05–4.38); 5.35 (SD = 3.06; 95% CI: 5.21–5.49); 3.55 (SD = 2.90; 95% CI: 3.05–4.05); 2.74 (SD = 2.84; 95% CI: 2.51–2.97) at the 1st, 2nd, 3rd, and 4th time points, respectively. The differences between periods were statistically significant (p <0.05) (*Figure 1*).

The average general anxiety score, consisting of parents' concerns about health, family, work, and future, was 5.31 (SD = 2.69; 95% CI: 5.22–5.39) among all participants, it was 5.14 (SD = 2.64; 95% CI: 4.99–5.29); 5.84 (SD = 2.58; 95% CI: 5.72–5.96); 4.48 (SD = 2.60; 95% CI: 4.04–4.93); and 4.23 (SD = 2.71; 95% CI: 4.01–4.45), at the 1st, 2nd, 3rd, and 4th time points, respectively. Except for the difference between 3rd and 4th period (p = 0.315), the difference between all periods were statistically significant (p <0.05) (*Figure 1*).

The change in the level of anxiety felt by parents regarding issues related to themselves and their children according to time points is shown in *Figure 1*. The mean anxiety score felt by parents about their children's health was 5.56 (SD = 3.33; 95% CI: 5.45–5.66) among all participants. There were significant differences

in the anxiety levels felt by parents regarding their children's health across the four time points (p <0.05). Anxiety peaked at the second time point with a mean score of 6.06 (SD = 3.24; 95% CI: 5.91–6.21) and reached its lowest level at the fourth time point with a mean of 4.59 (SD = 3.52; 95% CI: 4.31–4.87).

The relationship between independent variables and the anxiety levels of parents and children were examined. Significant predictors of higher anxiety included having a 3-year-old, higher parental education, multiple children, and working mothers. Lower anxiety was associated with supportive relationships, avoiding death-related news, and not using frightening language (*Table 2*).

Parents reported on their children's behaviors across four time points (*Figure 3*). Anxiety-related behaviors (excessive handwashing, fear of harm, frequent night waking, co-sleeping, and irritability) were most prevalent during the 1st and 2nd periods, then declined in the 3rd and 4th. Bedwetting and speech regression also peaked during the 2nd time point.

Children's use of expressions varied significantly across time points (*Figure 4*). Mentions of "death," "illness," "epidemic," "I miss my friends/school," and "I want to play outside" peaked at the 2nd time point and declined thereafter, reaching their lowest at the 4th. Conversely, "I am happy" was most frequently used at the 4th (42.2%) and least at the 2nd.

FIGURE 1. Daily new confirmed COVID-19 cases per million population, time points at which data were collected and anxiety levels perceived by parents for themselves and their children at different time points
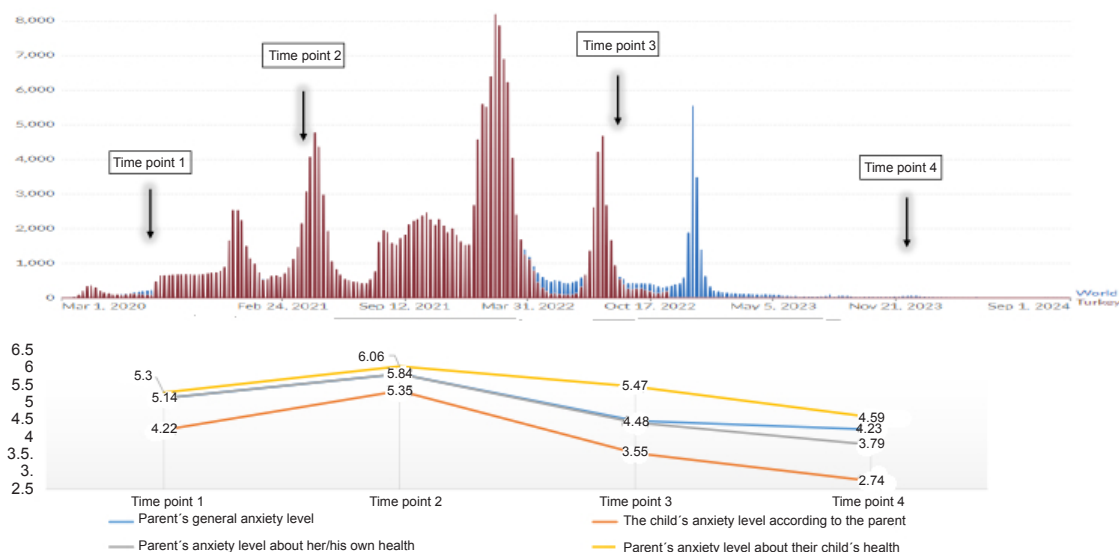
TABLE 2. *The relationship between sociodemographic characteristics and anxiety levels of parents and children*

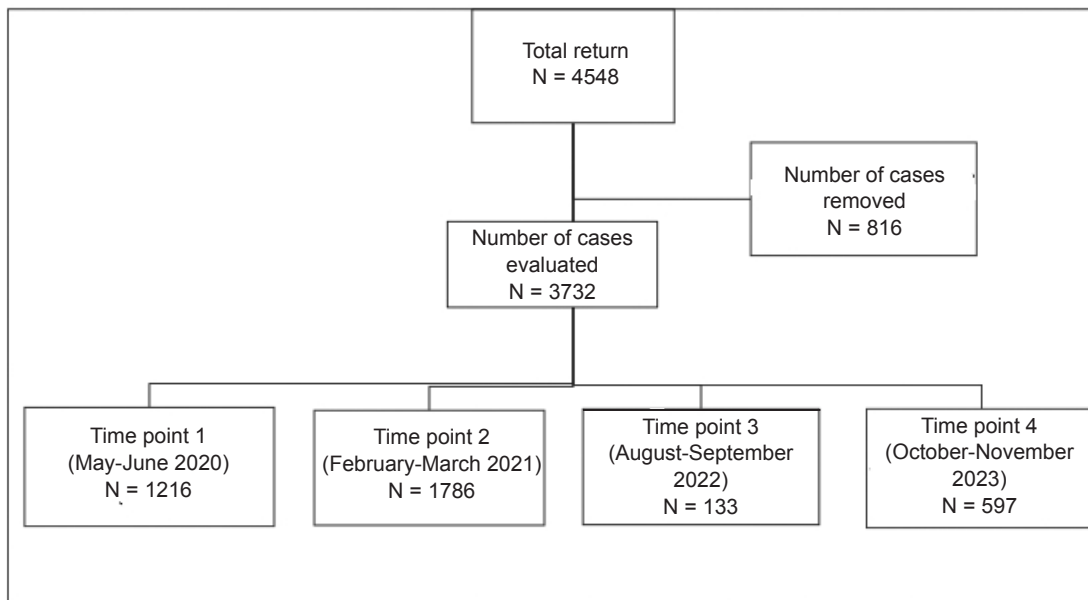| Features		Parents' anxiety level		Children's anxiety level	
		M ± SD	P value	M ± SD	P value
Child's age group	3	5.81 ± 2.68	.000[a]	4.54 ± 3.36	.000[a]
	4	5.18 ± 2.67	(difference:	4.18 ± 3.10	(difference:
	5	5.17 ± 2.69	3-4; 3-5; 3-6)	4.46 ± 3.10	3-4; 4-5; 4-6; 5-6)
	6	5.38 ± 2.68		4.84 ± 3.10	
Children's gender	Girl	5.42 ± 2.69	.510[b]	4.63 ± 3.23	.947[b]
	Boy	5.35 ± 2.73		4.62 ± 3.18	
Mother's education level	High school or less	5.17 ± 2.76	.000[b]	4.61 ± 3.23	.013[b]
	University	5.49 ± 2.58		4.35 ± 3.02	
Father's education level	High school or less	5.22 ± 2.74	.017[b]	4.61 ± 3.22	.007[b]
	University	5.43 ± 2.61		4.33 ± 3.02	
Family type	Nuclear	5.28 ± 2.68	.165[b]	4.48 ± 3.13	.299[b]
	Extended	5.47 ± 2.74		4.64 ± 3.22	
Sibling	None	5.16 ± 2.71	.048[b]	3.97 ± 3.06	.000[b]
	There is	5.36 ± 2.68		4.68 ± 3.15	
Mother's working status	Working	5.46 ± 2.65	.006[b]	4.40 ± 3.08	.103[b]
	Not working	5.21 ± 2.71		4.57 ± 3.18	
Economic level	Income is less than expenses[1]	5.73 ± 2.71	.000[a] (difference:	5.14 ± 3.26	.000[a] (difference:
	Income and expense are in balance[2]	5.17 ± 2.68	1-2,1-3, 2-3)	4.28 ± 3.07	1-2,1-3, 2-3)
	Income exceeds expenses [3]	4.80 ± 2.55		3.73 ± 2.82	
Is there a relative who died due to Covid 19?	Yes	5.65 ± 2.63	.006[b]	4.70 ± 3.25	.183[b]
	No	5.26 ± 2.69		4.47 ± 3.13	
Parent has a supportive partner	Yes	5.21 ± 2.74	.000[b]	4.41 ± 3.18	.001[b]
	No	5.61 ± 2.51		4.81 ± 3.00	
Parent has a supportive family	Yes	5.24 ± 2.71	.000[b]	4.42 ± 3.17	.000[b]
	No	5.68 ± 2.53		4.92 ± 2.97	
Parent has a supportive friend(s)	Yes	5.00 ± 2.75	.000[b]	4.08 ± 3.12	.000[b]
	No	5.51 ± 2.63		4.78 ± 3.13	
Listening to death news in front of the child	Yes	5.96 ± 2.77	.000[b]	5.38 ± 3.17	.000[b]
	No	5.20 ± 2.66		4.35 ± 3.11	
Frequently using frightening phrases to the child	Yes	5.83 ± 2.73	.000[b]	5.26 ± 3.23	.000[b]
	No	5.16 ± 2.66		4.28 ± 3.08	

[a]: One way Anova test.
[b]: Independent samples t test.
p: Significance level.

Anxiety-related behaviors (frequent handwashing (p = 0.008), night waking, bedwetting (p = 0.005), co-sleeping (p = 0.017), irritability (p = 0.000), fear of harm (p = 0.000), and speech regression (p = 0.000) were significantly more common in children exposed to death-related news or frightening parental language. These children also used negative expressions more often and "happy" less frequently (p = 0.001)

DISCUSSION

Most existing studies on the psychological impact of the COVID-19 pandemic were conducted during its early stages, with a notable paucity of research focusing specifically on preschool-aged children. Within the limited body of literature available, findings consistently report that young children experienced marked psychological disturbances, including separation anxiety, heightened fear, increased irritability, and a general sense of insecurity.[2,17,18] However, the longitudinal evolution of these behavioral symptoms within the same age cohort over different phases of the pandemic remains

Figure 2. Flow chart

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                    ┌──────────────────┐
                    │   Total return   │
                    │    N = 4548      │
                    └──────────────────┘
                             │
                             │              ┌──────────────────┐
                             │              │ Number of cases  │
                             │              │    removed       │
                             ├──────────────│    N = 816       │
                             │              └──────────────────┘
                    ┌──────────────────┐
                    │ Number of cases  │
                    │    evaluated     │
                    │    N = 3732      │
                    └──────────────────┘
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│ Time point 1 │ │ Time point 2 │ │ Time point 3 │ │ Time point 4 │
│(May-June 2020)│ │(February-March│ │(August-      │ │(October-     │
│   N = 1216   │ │  2021)       │ │ September    │ │ November     │
│              │ │   N = 1786   │ │ 2022)        │ │ 2023)        │
│              │ │              │ │   N = 133    │ │   N = 597    │
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inadequately explored.

This study assessed the progression of anxiety-related behavioral symptoms in children aged 3–6 years. At the second assessment point, approximately one year into pandemic restrictions and during a period of high infection rates, 87.8% of children displayed excessive handwashing; 52.7% exhibited frequent daytime irritability; 52% expressed fear of harm to themselves or their parents; 19.7% reported recurrent night awakenings; 34% sought co-sleeping with parents; 10.8% experienced nocturnal enuresis; and 7.8% showed signs of slurred speech. Frequencies at time point 2 were higher than in studies previously cited in the literature.[2,17-19] We think since the second time point reflects a period in which children were exposed to prohibitions for approximately 12 months, these frequencies are higher than those reported in the literature.
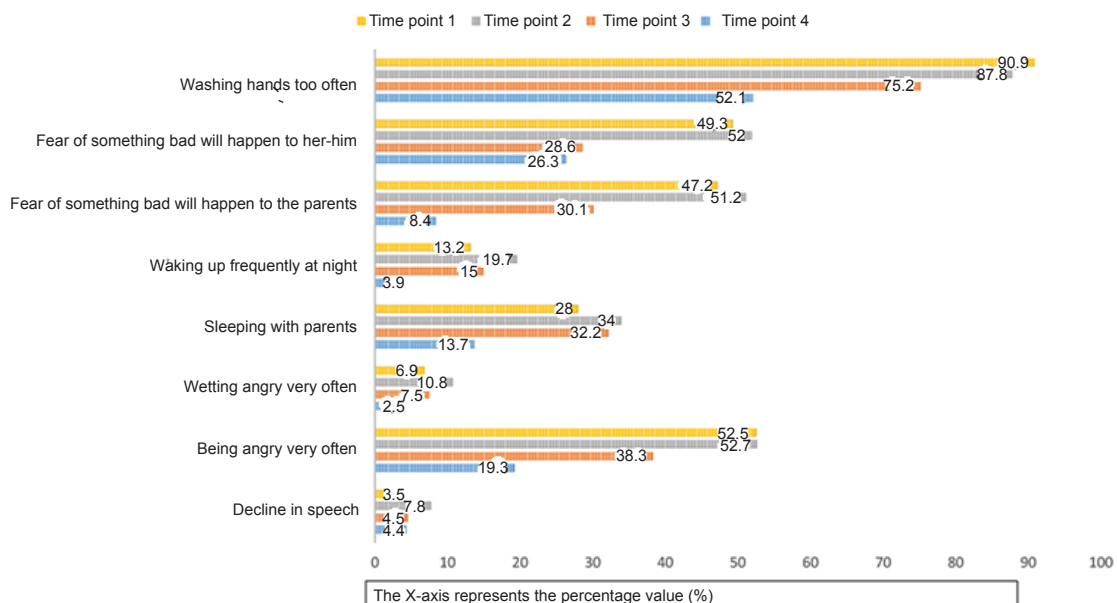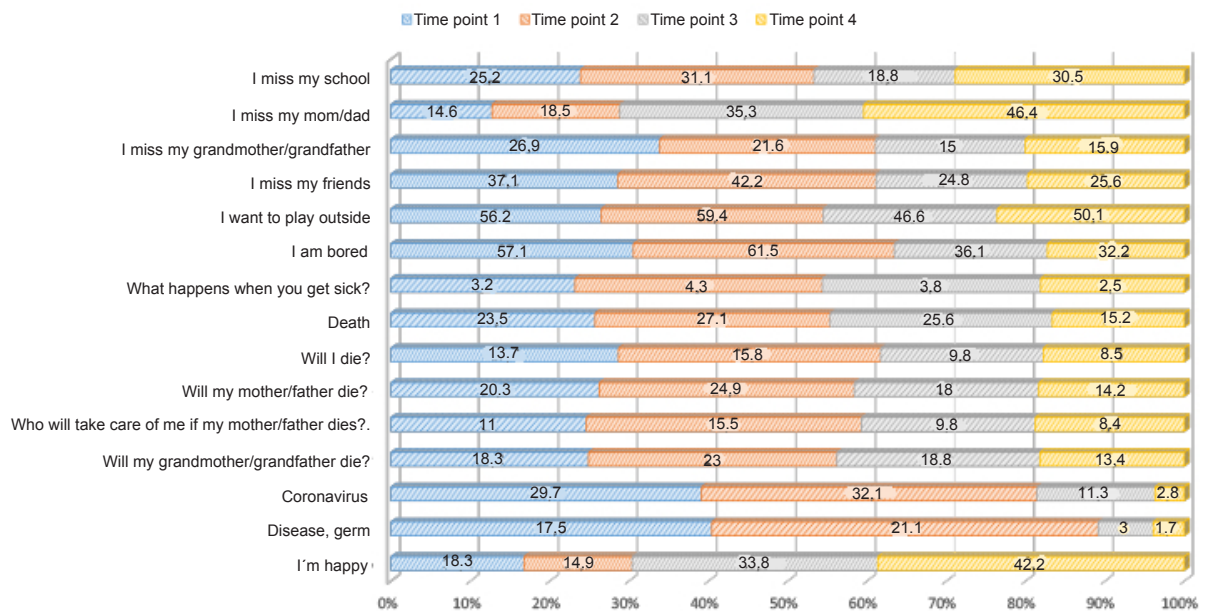
A study conducted 20 months after the

Figure 3. Change in children's frequency of various behaviors according to time points

The X-axis represents the percentage value (%)

Figure 4. Change in the frequency of expressions used by children according to time points

pandemic, covering children aged 9-18, found that even if the child attended school in person to some extent, the impact of social restrictions was still very evident.[20] At least a quarter of the children were often worried and experiencing negative emotions. In our study, although the effect of the pandemic decreased, children were still affected by the current situation until the 3rd time point. We saw that this effect decreased further at the 4th time point.

Similar to the changes in children's behavior, expressions including longing, fear of death, fear of getting sick, and boredom were used more frequently at the 2nd time point than at other time points. At the 3rd time point, when the bans were largely lifted, and the 4th time point, when the bans were completely lifted, we found that children in this age group used these expressions less, but the rates were still high. Children used the word 'I am happy' most frequently (42.2%) at time point 4 and least frequently (14.9%) at time point 2.

We found that children used behaviors and expressions that could be associated with anxiety more frequently at the first and second-time points. As the duration of restrictions applied to children during the pandemic increased, the effect on children increased. As the restrictions were lifted, the current situation had less impact on children. At the same time, the anxiety level of parents also showed a similar course to children,

even though the duration of restrictions applied to adults was shorter than that of children. From now on, when making decisions to restrict children in pandemic situations such as COVID-19, it may be helpful to consider children mental health.[11]

Studies are showing that media reports (text and images) and information received from other people (rumors) may be associated with negative mental health outcomes.[21-23] Similarly, in this study, we found that children who were exposed to death news through the media or were exposed to frightening sentences by their parents more frequently showed behaviors, expressions and words that may be related to anxiety or fear. Advising parents to limit parental exposure to exaggerated, negative news in the presence of their children may help to alleviate such fear.

This study is not a longitudinal study in which the same children were evaluated at four different time points. Therefore we do not know whether the anxiety levels and symptoms decreased in the same children at the later phases of the pandemic. However, the findings are valuable in observing how the pandemic conditions and the restrictions applied affected the same age range (3-6) over 4 years.

Strengths and weaknesses of the study

One limitation of the study was the use of online surveys for data collection. While this method enabled broader participation during the

pandemic when polyclinics were closed, response rates declined over time, resulting in varying sample sizes across time points. Nonetheless, the widespread use of similar methodologies during the pandemic allowed for meaningful comparisons with other studies.

The survey asked for a rating between 0 and 10 when assessing anxiety. We also want to emphasize that the answers to the questions about children's anxiety and behaviors in the survey may be affected by the parents' characteristics and perceptions.

Although we reached the target number at each time point, we accept that there were differences in sample size at the time points. While more people participated than we expected at the first and second time points, participation was the lowest at the third time. Individuals were contacted using the same method, but different numbers responded. They may have been more willing to respond to online surveys in the early stages of the pandemic, but less willing later on. Changes in work life may have also influenced individuals' willingness to respond. Since the sample size allows for statistical comparison, we did not find it appropriate to reduce the participant data at the first and second time points to equalize the participant numbers. It would be relevant to evaluate the results by considering these limitations.

The strength of the current study was that it observed the frequency of anxiety-related behaviors in the 3-6 age group at four different time points from the pandemic period to the present. We believe the study is valuable because there are very few studies on this age group, and it provides information about the temporal course.

CONCLUSION

We found that experiencing more social isolation, especially by being exposed to prohibitions for a long time, having anxious parents, hearing news of the death in the family, and being exposed to frightening sentences by their parents, increases children's level of parentally perceived anxiety and the frequency of behaviors or expressions that may be related to anxiety. A supportive environment for parents has been found to be an important factor that reduces parental anxiety. Since the timing and duration of the bans may vary according to the country, different data from around the world may help to elucidate some of the difficulties imposed on children by the pandemic. ∎

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