

# The Impact of the COVID-19 Pandemic On Long Term Behavior Problems in Typically Developing Preschool Children in Turkey

## COVID-19 Pandemisinin Türkiye’de Tipik Gelişen Çocukların Uzun Dönem Davranış Sorunları Üzerindeki Etkisi

Emel ÖMERCİOĞLU<sup>1</sup>, Aysel HAJIYEVA<sup>1</sup>, Ayşe METE YEŞİL<sup>1</sup>, Pınar ZENGİN AKKUŞ<sup>2</sup>, Elif N. ÖZMERT<sup>1</sup>

<sup>1</sup>Department of Pediatrics, Division of Developmental Pediatrics, Hacettepe University Faculty of Medicine, Ankara, Turkey

<sup>2</sup>Division of Developmental Pediatrics, Zeynep Kamil Maternity and Children Training and Research Hospital, Istanbul, Turkey



### ABSTRACT

**Objective:** Pandemics such as COVID 19, cause severe stress for both parents and children due to social constraints, changes in daily routines, and economic challenges, and can lead to long-term developmental and behavioral problems in children. We evaluated the behavioral problems of typically developing healthy children at the end of the second year of the pandemic, as well as the effect of family sociodemographic characteristics.

**Material and Methods:** This case-control study included 28 children between the ages of 18 to 60 months who admitted to Hacettepe University İhsan Doğramacı Children’s Hospital between January and February 2022 and 23 children from the pre-pandemic period. All of the children scored normally on the Ages and Stages Questionnaire (ASQ) in all developmental domains. The Child Behavior Check List (CBCL) was completed by parents.

**Results:** In terms of family sociodemographic characteristics, no significant difference existed between the two groups. Anxiety-depression scores were significantly higher in the post-pandemic group once CBCL scores were assessed ( $p=0.047$ ). In the final stepwise multiple regression model, maternal education level was significantly associated with lower anxiety-depression scores ( $p=0.030$ ). It was revealed that a maternal education level above high school reduced the anxiety-depression scores by 2.53 points in the post-pandemic group.

**Conclusion:** Families, pediatricians, and all other healthcare providers need to closely monitor preschoolers, who are among the groups most vulnerable to the negative effects of the pandemic. Additionally, new policies are required to eliminate health and social inequalities that deepen during the pandemic, especially in middle income and developing countries.

**Key Words:** Behavior problems, Children, COVID-19

### ÖZ

**Amaç:** COVID-19 gibi pandemiler sosyal kısıtlılıklar, günlük rutinlerdeki değişiklikler ve ekonomik zorluklara bağlı olarak hem ebeveynlerde, hem de çocuklarda strese neden olur ve çocuklarda uzun dönemde gelişimsel ve davranışsal



0000-0001-9551-9996 : ÖMERCİOĞLU E  
0000-0002-2665-9482 : HAJIYEVA A  
0000-0003-2985-6139 : METE YEŞİL A  
0000-0003-1704-0327 : ZENGİN AKKUŞ P  
0000-0002-4911-9200 : ÖZMERT EN

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**Ethics Committee Approval / Etik Kurul Onayı:** This study was conducted in accordance with the Helsinki Declaration Principles. The Ethics Committee of the Hacettepe University Faculty of Medicine approved this study (GO 22/615).

**Contribution of the Authors / Yazarların katkısı:** **ÖMERCİOĞLU E:** Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the Conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study, Reviewing the article before submission scientifically besides spelling and grammar. **HAJIYEVA A:** Planning methodology to reach the Conclusions, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study. **METE YEŞİL A:** Planning methodology to reach the Conclusions, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in necessary literature review for the study. **ZENGİN AKKUŞ P:** Planning methodology to reach the Conclusions, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study. **ÖZMERT EN:** Constructing the hypothesis or idea of research and/or article, Organizing, supervising the course of progress and taking the responsibility of the research/study, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Reviewing the article before submission scientifically besides spelling and grammar.

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Correspondence Address / Yazışma Adresi:

**Emel ÖMERCİOĞLU**

Department of Pediatrics, Division of Developmental Pediatrics,  
Hacettepe University Faculty of Medicine, Ankara, Turkey  
E-posta: emelomercioğlu@gmail.com

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sorunlara yol açar. Çalışmamızda pandeminin ikinci yılında tipik gelişen sağlıklı çocuklarda davranış problemlerini ve bu sorunlara aile sosyodemografik özelliklerinin etkisini değerlendirdik.

**Gereç ve Yöntemler:** Bu vaka kontrol çalışmasına, Ocak ve Şubat 2022 tarihleri arasında Hacettepe Üniversitesi İhsan Doğramacı Çocuk Hastanesi'ne başvuran yaşları 18-60 ay arasında 28 çocuk ve pandemi öncesi dönemden 23 çocuk dahil edildi. Çocukların tümünün Erken Gelişim Evreleri Envanteri değerlendirme sonuçları tüm gelişim alanlarında normaldi. Çocuk Davranışlarını Değerlendirme Ölçeği ebeveynler tarafından dolduruldu.

**Bulgular:** Aile sosyodemografik özellikleri açısından iki grup arasında anlamlı fark yoktu. Çocuk Davranışlarını Değerlendirme Ölçeği puanları değerlendirildiğinde anksiyete-depresyon puanları pandemi sonrası grupta anlamlı olarak daha yüksekti ( $p=0.047$ ). Çoklu regresyon modelinde, anne eğitim düzeyi düşük kaygı-depresyon puanları ile anlamlı bir şekilde ilişkililiydi ( $p=0.030$ ). Anne eğitim düzeyinin lise üstü olmasının pandemi sonrası gruptaki çocuklarda anksiyete-depresyon puanlarını 2.53 puan azalttığı gösterildi.

**Sonuç:** Aileler, çocuk doktorları ve diğer tüm sağlık çalışanları pandeminin olumsuz etkilerine karşı en savunmasız gruplardan biri olan okul öncesi çocukları yakın izlemelidir. Ayrıca, özellikle orta gelirli ve gelişmekte olan ülkelerde pandemi sürecinde derinleşen sağlık ve sosyal eşitsizliklerin ortadan kaldırılması için yeni politikalara ihtiyaç duyulmaktadır.

**Anahtar Sözcükler:** Davranış sorunu, Çocuk, COVID-19

## INTRODUCTION

Since 2020, the COVID-19 pandemic has affected the entire world, and many countries have been caught off guard. Government closure measures and policies aimed at reducing population movement and the uncertainty of the pandemic period have led to negative outcomes at the child, family, and service levels. School closures, changes in daily routines, increased screen time, fewer physical activities, economic difficulties, job losses, increased domestic stress, and restricted access to health services all have the potential to damage children's growth and development as well as the mental health of both children and parents (1,2).

Children and adolescents are the most vulnerable groups in terms of mental health. Comprehensive studies have revealed that during shutdown periods, most children and adolescents have an increase in emotional-behavioral issues and are highly burdened by the COVID-19 pandemic (3,4). In preschool children, negative emotional-behavioral circumstances such as crying, sleeping problems/nightmares, oppositional-defiant behaviors, clinginess, and fear that family members could contract the infection were observed, in addition to internalization problems such as emotional reactivity, withdrawn, and anxiety-depression (3,5,6). Anxiety and depression symptoms in school-aged children; irritability, intense depressive symptoms, increased levels of stress, worry, concern, and fear associated with COVID-19 were prominent in adolescents (3,7,8). Studies on preschool children, who respond to stress with a wide range of symptoms due to age-related developmental characteristics and are the most vulnerable group for persistent mental problems if these symptoms are not recognized and treated early, are few in comparison to other age groups (3,6).

Developmental variations in cognitive, verbal, emotional, and social skills are critical for coping with stress, understanding and processing complicated situations such as routine changes and pandemic processes, and responding positively emotionally and behaviorally (3,9). In addition to the individual developmental-behavioral disadvantages of children with acute/

chronic diseases, neurodevelopmental disorders, and special education needs, access restrictions to health services and private education institutions, as well as school closures, have exacerbated psychosocial problems. Considerable research has shown that these children had more mental health problems than healthy children during the pandemic's shutdown periods (8,10,11). The 'healthy children' in the research were those who were described as such by the families and who did not have a chronic illness. Studies on the impacts of the pandemic are needed, particularly in children who have been proven to have typical development and behaviors and whose stress coping skills are expected to be better.

Recent research suggests that the acute challenges associated with the COVID-19 pandemic will be long-lasting and the long-term effects of the pandemic on preschoolers are limited (12-14). The goal of this study was to evaluate the behavioral problems of children with typical development 2 years from the start of the pandemic, and to determine how these problems were related to family sociodemographic characteristics.

## MATERIALS and METHODS

This study was conducted at Hacettepe University Faculty of Medicine Department of Developmental Pediatrics, and all parents who participated in this research provided written informed consent. The Ethics Committee of the Hacettepe University Faculty of Medicine approved this study (GO 22/615). Children aged 18 to 60 months who visited Hacettepe University general pediatric outpatient clinic for reasons apart from developmental-behavioral issues were evaluated using the Ages and Stages Questionnaire (ASQ) between January and February 2022. The patients evaluated were all term born children with normal growth and developmental milestones and no chronic disease. Furthermore, the children were not followed up on for any behavioral issues. The study group comprised of 28 children who had normal development in communication, gross motor, fine motor, problem solving, and personal social areas as a result of the developmental evaluation. Children

who had developmental delays in any area were monitored for further assessment and not included in this study. The sociodemographic characteristics of the study participants and their families, such as parental age and educational level, was obtained. The Child Behavior Check List (CBCL) was completed by parents. Likewise, the sociodemographic characteristics and CBCL scores of 23 control group children who met all of the following inclusion criteria were established from the control groups of two studies conducted at Hacettepe University Department of Developmental Pediatrics in 2019 (15,16). The following tools were used to conduct screening for developmental and behavioral issues.

### The Ages and Stages Questionnaire (ASQ)

The ASQ, one of the most extensively used developmental screening tools in pediatric practice, evaluates children aged 3 to 72 months in the areas of communication, gross motor, fine motor, problem solving, and personal-social development (17). Although the ASQ was designed to be completed by parents, in this study, the researchers scored the items in the questionnaire by asking or observing the child in conjunction with the literature (18). While a score above the cutoff values in all domains is accepted typical development, children with a score below 2 SD in at least one domain are regarded to have a positive screening test for developmental delay. The sensitivity and specificity of the Turkish version of the ASQ are 0.94 and 0.85, respectively (19).

### Child behavior checklist for ages 1.5 to 5 years (CBCL/1.5–5)

This instrument is used to identify behavioral and psychiatric issues in children aged 18 to 71 months, and the results are obtained by having parents score own children's behaviors. CBCL/1.5–5, that comprises 100 items, has seven syndrome scores as follows: (i) emotionally reactive, (ii) anxious/depressed, (iii) somatic complaints, (iv) withdrawn, (v) sleep problems, (vi) attention problems, and (vii) aggressive. High scores indicate more problematic behavior. Moreover, the combination of emotionally reactive, anxious/depressed, somatic complaints, and withdrawn scores constitute the "Internalizing Problems score" and the combination of attention problems and aggressive scores constitute the "Externalizing Problems score." The "Total Problems score" is composed of these scores, the seven syndrome scores, and the one item added by the parents (20). Parents completed the CBCL/1.5–5 to evaluate the behavioral difficulties of the children in this study (21, 22).

### Statistical analysis

IBM SPSS Version 22.0 was used to perform the statistical analysis. The numerical variables were summarized as median (min–max, interquartile range (IQR)), while categorical variables were reported as frequencies and percentages. The Mann Whitney U test was used to determine the differences between the groups (prepandemic vs. postpandemic children)

in continuous variables, whereas the Pearson Chi-square test or Fisher's exact test was used to determine such differences in categorical variables. The relationship among continuous variables was determined by the bivariate Spearman correlation coefficients. A multiple linear regression model was performed to test whether the family sociodemographic characteristics predict child behavior problems after the pandemic. A p-value of less than 0.05 was considered significant.

## RESULTS

The median age of the 23 children in the pre-pandemic group was 42 months (IQR: 20), and the median age of the 28 children in the post-pandemic group was 37 months (IQR: 23), with no significant difference between the ages. In terms of family sociodemographic characteristics, no significant difference existed between the two groups (age, educational status, employment status, number of siblings, etc.) (Table I). Anxiety-depression scores were significantly higher in children in the postpandemic group once CBCL scores were assessed. The post-pandemic group had higher scores in the somatic complaints and sleep problems but they did not achieve statistical significance (Table II).

There was no relationship between sociodemographic variables (child age, maternal and paternal age, education level, employment, chronic disease condition, number of siblings and members of the family, birth order of the child) and CBCL scores in the pre-pandemic group. Table III shows the correlation between the sociodemographic characteristics and CBCL scores in the post-pandemic group. Children whose mothers had less than a high school education had significantly higher withdrawn (<high school median:3 IQR:3.5, >high school median:1 IQR:2), anxiety-depression (<high school median:5 IQR:2.5, >high school median:3 IQR:2), internalization problem (<high school median:15 IQR:10, >high school median:7 IQR:4), and total problem scores (<high school median:43 IQR:34.5, >high school median:27 IQR:23) (respectively;  $p=0.026$ ,  $p=0.002$ ,  $p=0.008$ ,  $p=0.034$ ). Anxiety-depression (unemployed median:4 IQR:2, employed median: 2 IQR:2.75), somatic complaints (unemployed median:3.5 IQR:2.5, employed median:2 IQR:2.75), and internalizing problem (unemployed median:10 IQR:9, employed median:5.5 IQR:5.5) scores were also higher in children with unemployed mothers (respectively;  $p=0.006$ ,  $p=0.038$ ,  $p=0.017$ ).

Stepwise multiple regression analyses were used to show the important risk factors related to anxiety-depression scores, so variables such as the number of siblings and household members, maternal education level and employment status, and child birth order were included in the model. In the final model, maternal education level was significantly associated with higher anxiety-depression scores ( $p=0.030$ ). It was revealed that a maternal education level above high school

**Table I : Sociodemographic Characteristics of Families**

Variable, n(%) or median (minimum-maximum)	Pre-pandemic group (n=23)	Post-pandemic group (n=28)	p
Age (months)	42 (20-60)	37 (24-59)	0.353
Maternal age (years)	33 (25-41)	31 (22-40)	0.160
Maternal education (n)			0.603
≤High school	9 (39.1)	9 (32.1)	
>High school	14 (60.9)	19 (67.9)	
Maternal employment status			0.964
Employed	10 (43.5)	12 (42.9)	
Unemployed	13 (56.5)	16 (57.1)	
Chronic disease in mother			0.061
Yes	7 (30.4)	2 (7.1)	
Paternal age (years)	36 (28-43)	34.5 (27-44)	0.494
Paternal education (n)			0.914
≤High school	8 (34.8)	9 (39.1)	
>High school	15 (65.2)	18 (66.6)	
Paternal employment status			1
Employed	23 (100)	26 (96.3)	
Unemployed	0 (0)	1 (3.7)	
Chronic disease in father			0.270
Yes	6 (26)	3 (11.1)	
Number of sibling	0 (0-3)	0 (0-2)	0.559
Number of members in the family	3 (3-6)	3 (3-6)	0.639
Birth order of the child	1 (1-4)	1 (1-3)	0.817

**Table II Distribution of the CBCL\* scores before and after the COVID19 pandemic**

Scores of child behavior checklist	Pre-pandemic group (n=23)	Post-pandemic group (n=28)	p
Emotionally reactive	2 (0-5)	2 (0-8)	0.794
Anxiety/depression	2 (0-6)	3 (0-8)	0.047
Somatic complaints	1 (0-9)	3 (0-9)	0.057
Withdrawn	1 (0-4)	1 (0-5)	0.590
Sleep problems	3 (0-7)	3.5 (0-14)	0.067
Attention problems	4 (0-6)	3 (0-7)	0.729
Aggressive behavior	7 (0-16)	8.5 (2-20)	0.171
Internalizing problem score	6 (0-19)	9 (1-26)	0.146
Externalizing problem score	9 (0-22)	11 (3-24)	0.271
Total problem score	26 (0-58)	31.5 (10-71)	0.097

Median value and minimum–maximum values are presented,  $p < 0.05$  is significant, \* Child Behavior Checklist

reduced the anxiety-depression scores by 2.53 points (95% confidence interval (CI): (-4.143) – (-0.921)).

## DISCUSSION

Pandemic periods, such as COVID-19, cause severe stress for parents and children due to social restrictions, infection risk, and economic difficulties, and could be considered as adverse childhood experiences (ACEs) (23,24). Eventually, toxic stress develops once children’s negative experiences and stress load persist as well as in the absence of the protective buffering effect of a supportive caregiver relationship. It is critical to understand

and identify the effects of the pandemic on preschool children, particularly given that toxic stress can cause permanent deterioration and changes in learning (cognitive, language, social emotional skills), behaviors, and physical health, particularly in early childhood when brain plasticity is at its peak (25). The mid-long-term effects of the pandemic following the acute closure processes are still being researched in this context.

In this study, preschoolers’ anxiety-depression scores at the end of the second year of the pandemic were shown to be statistically significantly higher than they were prior to the pandemic. In the comprehensive COPSYP South Tyrol 2021 study, which investigated children and adolescents aged 7



**Table III: Correlations between the sociodemographic characteristics and CBCL scores in the post-pandemic group**

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Child age	1.000													
2	Number of sibling	.166	1.000												
3	Birth order of the child	.137	.808**	1.000											
4	Number of members in the family	.066	.911**	.599**	1.000										
5	Emotionally reactive	.302	.270	.117	.254	1.000									
6	Anxiety/depression	.157	.478*	.326	.413*	.579**	1.000								
7	Somatic complaints	-.024	.244	.195	.210	.488**	.575**	1.000							
8	Withdrawn	.458*	.210	-.128	.222	.553**	.318	.232	1.000						
9	Sleep problems	.325	-.066	-.193	-.063	.457*	.521**	.296	.263	1.000					
10	Attention problems	-.131	-.218	-.384*	-.198	-.042	-.163	-.013	.153	-.005	1.000				
11	Aggressive behavior	-.166	.080	-.231	.166	.489**	.397*	.390*	.543**	.398*	.361	1.000			
12	Internalizing problem	.273	.356	.173	.330	.827**	.831**	.778**	.599**	.533**	-.064	.573**	1.000		
13	Externalizing problem	-.168	.024	-.284	.089	.414*	.295	.328	.514**	.340	.609**	.951**	.472*	1.000	
14	Total problem	.151	.181	-.080	.189	.706**	.658**	.650**	.627**	.642**	.218	.824**	.863**	.771**	1.000

\* $p < 0.050$ , \*\* $p < 0.010$ ,

to 19 at the end of the first year of the pandemic, behavior problems, anxiety, depressive symptoms, and psychosomatic symptoms all increased, and mental health issues were more affected negatively in young children (12). In like manner, in the second year of the pandemic, general mental health issues, anxiety, and depressive symptoms in children and adolescents were still greater than they were before the pandemic, according to the longitudinal German COPSYS research (26). Preschoolers and school-age children both exhibited higher internalizing problems and post-traumatic stress symptoms in December 2021 than in March 2020, according to another comprehensive study that looked into the behavioral issues of children ages 3 to 13 at four different time points (14). In keeping with the literature, this study emphasizes the long-term impacts of the pandemic on children.

The socioeconomic status of the family and the mental health issues that children and adolescents experience are strongly correlated. These socioeconomic characteristics of the family play a significant role in the adjustment and behavior of both the child and the parents to stressful circumstances. Longitudinal studies revealed that children who lived in persistently low socioeconomic conditions were more susceptible to mental health issues than their peers who did not. The most potent predictors of these mental issues are low household income and low parental education, which are the most critical predictors of socioeconomic level (27, 28). In this study, children of mothers with lower education levels had significantly higher levels of withdrawn, anxiety-depression, internalization, and total problem scores, whereas children of unemployed mothers had significantly higher levels of withdrawn, anxiety-depression, somatic, and internalization problems. It has been demonstrated in studies looking at child behavioural problems during the pandemic that low parental education levels and socioeconomic status are linked to an increase in mental

health issues (4,12,26). In addition to the stress caused by economic hardships in families with low socioeconomic status, this situation can be clarified by the relationship between low maternal education level and negative parental practices in areas like communication, child care, and positive discipline (29, 30). Anxiety-depression scores were higher as there were more family members and siblings present in the post-pandemic period, regardless of the fact that this finding did not achieve statistical significance in the multiple regression analysis. The increased number of children and family members at home all through pandemics can exacerbate sibling conflicts, create a complicated home environment, increase caregiver workload, reduce one-on-one time spent with children, and thus increase mental health problems in children (3,13,31).

One of our study's strengths is that it is one of the few studies looking at how the COVID-19 pandemic has affected preschoolers' behavioral issues over the mid-long term. Furthermore, unlike previous studies examining the effects of the pandemic on healthy children, the physical and developmental evaluations of the children in this study were performed using worldwide validated assessment tools, and then healthy children with typical development were included in the study (10, 11, 32). Another strength we have is that the pre-pandemic and post-pandemic groups are equivalent in terms of sociodemographic characteristics and developmental status. The small number of participants is one of the study's limitations. Moreover, having failed to evaluate parental stress, parental self-efficacy, and home environment characteristics, which may be closely related to the factors that cause of behavioral problems in children, was a limitation. As stress and anxiety levels may rise in mothers and fathers during the pandemic period regardless of education level and sociodemographic characteristics, one of the study's limitations is the lack of

information on this subject. Another limitation is the inability to obtain from the families the household income data necessary for a more accurate assessment of socioeconomic status.

It is noteworthy that at the end of the second year of the pandemic, anxiety-depression symptoms in children with typical development, who are thought to have relatively better coping mechanisms with stressful situations, proceed to be higher than prior to the pandemic. Given that it is well known that early behavioral problems frequently persist into adolescence and adulthood, it is crucial to identify and explore these issues. Families, pediatricians, and all other healthcare providers need to closely monitor preschoolers because they are one of the most vulnerable age groups to the extreme stress load that comes with the pandemic process and since they exhibit complex symptoms when stressed. Additionally, new policies are required to eliminate health and social inequalities that deepen during pandemic processes, especially in low-income and developing countries, given that low parental education and socioeconomic characteristics boost these mental problems.

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