



# The relationship between online learning, associated factors and emotional/behavioral problems in primary school 1<sup>st</sup> grade students

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## Abstract

**Aim:** The use of online learning, which has spread rapidly worldwide in recent years, has increased considerably with the COVID-19 pandemic. The study aimed to evaluate the online learning experience of children attending primary school 1st grade and the relationship between online learning, related factors, and emotional/behavioral problems.

**Materials and Methods:** This study was carried out with 378 mothers who have a child attending primary school 1<sup>st</sup> grade. Demographic data were assessed with the Sociodemographic Data Form, which included information about the online learning process and school, and the parent-rated Strengths and Difficulties Questionnaire (SDQ) to assess emotional/behavioral problems.

**Results:** 50.5% of the mothers reported that their children experienced emotional/behavioral problems, while 45.3% reported that online learning exacerbated their children's emotional/behavioral problems. SDQ emotional problems score was significantly higher in girls, while SDQ conduct problems and Hyperactivity/inattention subscores, and SDQ total scores were significantly higher in boys. The SDQ peer problems subscore and SDQ total scores of illiterates were significantly higher than those of literates. There was a significant negative correlation between the extracurricular screen time and all SDQ scores except the prosocial behavior subscore. The SDQ conduct problems and peer problems subscores and SDQ total scores of children with regular activities/hobbies were significantly lower than the others, while the SDQ prosocial behavior score was significantly higher.

**Conclusion:** Our study findings showed that online learning negatively affected almost half of the children in terms of emotional/behavioral problems for different reasons, gender can lead to differences in emotional/behavioral problems in early childhood, illiterate children and children with increased extracurricular screen time may be more at risk in terms of emotional/behavioral problems and regular activities/hobbies may contribute positively to the process.



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## Introduction

Homeschooling is defined as the provision of a child's education at home by parents [1]. Prior to the COVID-19 pandemic, approximately 1.7 million American children were homeschooled, and the percentage of homeschooled students had roughly doubled compared to the rates in 1999 (1.7 percent in 1999, 3.3 percent in 2016 of all US students aged 5-17) [2]. Although parents who provide homeschooling use various educational approaches, about half of them prefer online learning [3].

In the literature, various terms (e-Learning, online learning, distance learning, etc..) have been used to describe different modes of providing education beyond traditional face-to-face learning [4]. Distance learning has traditionally been defined as education offered to geographically distant individuals and is considered an umbrella term [5]. Online learning is defined as 'learning experienced through the internet in the synchronous or asynchronous environment where students interact with instructors and other students and are not dependent on their physical location for participating in this online learning experience' [6]. In our study, we used the term 'online learning' instead of 'distance and online learning'. Online learning, which has a history spanning almost two centuries, was already preferred by some segments of society before the pandemic [1].

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However, due to the need for social distancing rather than geographical distance during the pandemic, it became a mandatory choice [5].

There are many discussions regarding the advantages and disadvantages of online learning. It provides easier access to more information with lower financial costs, without constraints of time, location, and pace. Nevertheless, very few researchers believe it has a positive impact on learning. Moreover, creating a sense of social presence and engagement in online learning communities is quite challenging. Issues such as lack of interaction and participation, inadequate or delayed feedback continue to be a concern [4, 7, 8]. Furthermore, it is emphasized that online learning may pave the way for various problems in children, especially young children, such as online risks and dangers, internet addiction, social isolation, and physical health issues [9, 10].

During the pandemic, the whole world was forced to quickly switch to online learning. In the limited number of studies conducted during this period, it has been reported that online learning is more problematic and challenging than face-to-face education for preschool and elementary school children and their families [5, 7]. However, during this period, there is a lack of data on how the potential inequality caused by the digital divide and distance learning practices among children affects them emotionally and behaviorally, as well as the identification of at-risk children [11]. The impact of online learning on the emotional/behavioral aspects of children attending primary school 1<sup>st</sup> grade, who are too young to fully comprehend the context of online learning, are illiterate, and have recently been introduced to academic discipline, is not yet fully understood.

Online learning has become an important component of education globally, independent of the pandemic, and it has been consistently increasing in popularity [6]. Additionally, due to other potential natural disasters such as future predicted pandemics, earthquakes, fires, and floods, online learning is expected to gain even more prominence [12]. Taking all these factors into consideration, there is a clear need for a comprehensive assessment of the challenges faced by children and parents in relation to online learning, and the impact of these challenges and learning conditions on children's emotional/behavioral problems.

To the best of our knowledge, in this study that will be conducted for the first time, the online learning experiences, challenges, extracurricular screen time, activities/hobbies, and the relationship of all these factors with emotional/behavioral problems in children attending primary school 1<sup>st</sup> grade in one month after the transition to online learning for the second time when the acute psychosocial effects of the pandemic decreased were examined through parental views.

## Materials and Methods

This cross-sectional study was approved by the local Medical Research Ethics Committee of Kahramanmaraş Sütçü İmam University (Date: 8.2.2021, session no: 2021/05, Decision no: 07) and was conducted by the principles of the Declaration of Helsinki. The study was conducted with an

online survey between 20.12.2020-20.01.2021 (1 month after the transition to online learning for the second time). Only a few days after the first COVID-19 case was reported in Turkey on 11 March 2020, online learning (via Zoom or the website provided by the school) was started in schools and continued until the end of the semester. In September 2020, schools started face-to-face education as the pandemic effect declined. However, within the scope of social distancing interventions, weekly school attendance days varied between 2 and 4 days depending on the class density between schools. On 20 November 2021, due to the resurgence of infections, the switch to online learning for the second time took place in Turkey.

Applying the sample calculation method, and taking into account that there are 1,300,000 first-grade students in Turkey, the sample size was determined to be 385 individuals with a 5% margin of error and a 95% confidence interval. In the study, mothers of children attending primary school 1st grade were invited to participate in an online survey via Google Forms. After agreeing to participate, 400 respondents completed the survey. 14 participants with active psychiatric illness and 8 participants with incorrect birth dates were excluded, leaving a total of 378 mothers included in the study. The online survey consists of three parts. The first part is a written consent request obtained before filling out the questionnaires. In the second part, participants completed a demographic information form, including details about online learning and school-related information. In the third part, they filled out the Strengths and Difficulties Questionnaire (SDQ) parent form.

### Screening instruments

The sociodemographic form was developed by the researchers. The survey items were reviewed by experts for quality assurance and first piloted by a group of parents and Child Psychiatrists and modified according to the suggestions. The final questionnaire is a 2-stage form. The first stage includes the demographic data of the child and family members and the child's past psychiatric and medical information, while the second stage involves the child's school information, education hours, accompanying person information during online learning, the difficulties experienced with online learning, the teacher's previous complaints about the child and the reasons, children's emotional/behavioral difficulties levels, the effect of online learning on the child's emotional/behavioral problems, the average extracurricular screen time in the last 1 week, the subjects that the child is interested in on the screen, the child's regular activities/hobbies (playing toys, puzzle/box games, painting, music, growing flowers, taking care of pets, doing housework) and the frequency of application (always or not).

Strengths and Difficulties Questionnaire (SDQ) SDQ was developed by Robert Goodman [13]. There is a parent form for ages 4-16. It contains 25 questions. All items are rated on a three-point scale (0 = not true, 1 = Sometimes or somewhat true, and 2 = certainly true). These questions are grouped under 5 subscales: Emotional problems, Conduct problems, Hyperactivity/inattention, Peer problems, and Prosocial behavior. As each subscale is evalu-

ated within itself, the sum of the first four subscales gives the total score. While high scores in prosocial behavior reflect the individual's strengths in the social field; High scores in the other four areas reflect the severity of the problem areas. It was observed that the scale adapted to Turkish was consistent and reliable [14]. It was determined that SDQ scores were highly correlated with standardized interview results ( $r=0.74$ ) and detected an individual with a psychiatric disorder with a specificity of 94.6% [15]. Two different methods are generally used when evaluating SDQ scores. The first is the interpretation of each subtest's mean scores; the second is to specify the proportions of cases above the predetermined threshold [16]. The values given on the SDQ UK site for determining threshold values in SDQ scores are as follows: Emotional problems score: 0-3 normal, 4 borderline, 5-10 abnormal, Conduct problems score: 0-2 normal, 3 borderline, 4-10 abnormal, Hyperactivity/inattention score: 0-5 normal, 6 borderline, 7-10 abnormal, Peer problems score: 0-2 normal, 3 borderline, 4-10 abnormal, Prosocial behavior score: 6-10 normal, 5 borderline, 0-4 abnormal, Total score: 0-13 normal, 14-16 borderline, 17-40 abnormal.

### Statistical analysis

Analyzes were evaluated in 22 package programs of SPSS (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL). All data were expressed as mean  $\pm$  SD, number (n), median (min-max), or percentage (%) as appropriate. Chi-square analysis (Pearson Chi-square) was used to compare categorical variables between groups. Kolmogorov-Smirnov tests were used to determine whether numerical variables exhibited normal distribution in independent groups. Continuous variables were compared using the Student's t-test or the Mann-Whitney U test depending on normality. Comparison of multiple dependent variables across groups was conducted with MANOVA followed by univariate ANOVAs (Bonferroni corrected) for normal distribution and Kruskal-Wallis test was used if it did not show normal distribution. Correlations were evaluated using Pearson correlation analysis. All analyzes were evaluated within the 95% confidence interval. The statistical significance level in the analysis was accepted as  $p<0.05$ .

## Results

### *Sociodemographic characteristics and online learning information of the sample*

The mean age of the children included in the study was  $80.5\pm 5.4$  months (min-max: 68-91 months), and 47.4% (n=179) were female. The sociodemographic characteristics of the sample are given in Table 1.

Our sample's school background information, reading levels, characteristics related to school and online learning before and after the full lockdown during the pandemic, teacher's complaints and their reasons, the accompanying situation of an adult during online learning, and difficulties are given in Table 2.

Table 3 presents information on children's levels of emotional and behavioral problems, the impact of online learning on these problems, extracurricular screen time, and

**Table 1.** Sociodemographic characteristics of the sample.

Variables	n	%
<b>Gender</b>		
Male	199	52.6
Female	179	47.4
<b>Age groups</b>		
Under 80 months	194	51.3
Over 80 months	183	48.4
<b>Place of residence</b>		
Urban	335	88.6
Rural	43	11.4
<b>Family monthly income level<sup>†</sup></b>		
Low	17	4.5
Medium	122	32.3
High	239	63.2
<b>Number of siblings</b>		
1	120	31.7
2	181	47.9
3	65	17.2
4 and over	12	3.2
<b>Level of education of the mother</b>		
Primary-Secondary school	24	6.3
High school	40	10.6
University	183	48.4
Upper University	131	34.7
<b>Level of education of the father</b>		
Primary-Secondary school	22	5.8
High school	33	8.7
University	186	49.2
Upper University	137	36.2
<b>Mother's Employment Status</b>		
Housewife	127	33.6
Online at home	42	11.1
Less than 3 days a week	39	10.3
4-5 days a week	151	39.9
More than 5 days a week	19	5.0

<sup>†</sup>The level of income was determined by the minimum wage value on the date of the study.

the subjects that interest the child on screen, and the children's regular activities / hobbies.

### *SDQ scores by gender, age, and threshold value of the sample*

When our sample was classified according to gender; SDQ emotional problems scores were significantly higher in girls ( $p:0.04$ ), while SDQ conduct problems, hyperactivity/inattention, and total scores were significantly higher in boys (respectively  $p:0.002$ ,  $p<0.001$ ,  $p:0.03$ ). The emotional/behavioral problems of our sample were evaluated according to the threshold values defined on the SDQ UK website. In terms of the number of children exceeding

the threshold value, there was no significant difference between the genders in other areas, but SDQ hyperactivity/inattention subscale scores were significantly higher in

**Table 2.** School and online learning information of sample.

Variables	n	%
<b>School</b>		
MoNE public schools	146	38.6
MoNE private schools	232	61.4
<b>Literacy status</b>		
Illiterate	159	42.1
Literate	219	57.9
<b>Weekly hours of participation in face-to-face education before online learning</b>		
Never gone	27	7.1
2 days in a week	186	49.2
3 days in a week	11	2.9
4 days a week	35	9.3
5 days a week	119	31.5
<b>Number of weekly hours of online learning</b>		
Less than 10 hours	58	15.3
10-20 hours	102	27.0
20-30 hours	146	38.6
More than 30 hours	72	19.0
<b>Being accompanied by an adult during online learning</b>		
Yes	208	55.0
No	170	45.0
<b>Accompanying person during online learning</b>		
Mother	149	71.6
Caregiver	31	14.9
Other person	28	13.5
<b>Presence of difficulties in online learning</b>		
Yes	299	79.2
No	79	20.8
<b>Difficulties related to online learning</b>		
Easily distracted	182	48.1
Internet and technological difficulties	171	45.2
Inability to stand still at the computer	161	42.6
Inability to accompany and follow the child	134	35.4
Other issues	12	3.2
<b>Teacher's complaint</b>		
Yes	81	21.4
No	296	78.3
<b>Teacher's complaint reason</b>		
Attention problems	33	8.7
Hyperactivity/impulsivity	40	10.6
Anxiety	11	2.9
Social Communication Problem	10	2.6
Problems With Learning	10	2.6

**Table 3.** Emotional and behavioral difficulties, extracurricular screen time, and regular activities and hobbies of the sample.

Variables	n	%
<b>Children's emotional/behavioral difficulties level</b>		
None	187	49.5
Mild	152	40.2
Severe	35	9.3
Very severe	4	1.1
<b>Effect of online learning on the emotional/behavioral problem</b>		
Decreased	18	4.8
No change	189	50.0
Increased	153	0.5
Increased a lot	18	4.8
<b>Daily extracurricular screen time</b>		
Less than 1 hour	114	30.2
1-3 hours	97	52.1
More than 3 hours	67	17.7
<b>Subjects that the child is interested in on the screen</b>		
Educational videos	10	2.6
Social network videos	37	9.8
Movies/cartoons	79	20.9
Online games	33	8.7
<b>Regular activities/hobbies</b>		
Yes (always)	246	65.1
No	132	34.9
<b>Regular activities/hobbies</b>		
Playing toys	156	41.3
Puzzle/box games	79	20.9
Painting	152	40.2
Music	33	8.2
Growing flowers	24	6.3
Taking care of pets	50	13.2
Doing housework	65	17.2

boys ( $p:0.001$ ). The SDQ mean scores of the sample and the distribution according to SDQ threshold values are given in Table 4.

No significant correlation was observed between the children's ages (in months) and SDQ scores (all  $p>0.05$ ). Furthermore, there was no significant age (in months) difference between literate and illiterate children ( $p>0.05$ ).

#### *SDQ scores by sociodemographic characteristics and online learning-related factors of the sample*

There were no significant differences in SDQ scores between groups based on place of residence, monthly income level, number of siblings, parent's education level, mother's employment status, face-to-face education in the month before starting online learning, weekly hours of online learning, children participating in online learning at home, and the individuals who accompany the children

**Table 4.** SDQ scores of the sample and the distribution according to SDQ threshold values.

Scales	Total (n:378) Mean±SD	Girl (n:179) Mean±SD	Boy(n:199) Mean±SD	t/Z	p
Emotional problems	2.11±1.93	2.32± 1.80	1.91± 2.03	2.065	<b>0.04*</b>
Conduct problems, Median (min-max)	1.0(0-9)	1.0 (0-9)	2.0 (0-7)	-3.14	<b>0.002**</b>
Hyperactivity/inattention	3.89±2.4	3.43± 2.26	4.31± 2.47	-3.58	<b>&lt;0.001*</b>
Peer problems	1.96±1.5	1.85± 1.52	2.06± 1.54	-1.27	0.204*
Prosocial behavior	7.98± 1.7	8.08± 1.78	7.88± 1.62	1.141	0.255*
Total score	9.46±4.9	8.89± 4.73	9.97± 4.92	-2.18	<b>0.03*</b>
	n (%)	n (%)	n (%)	X <sup>2</sup>	
Emotional problems	42 (11.11)	19 (10.61)	23 (11.56)	0.016	0.899***
Conduct problems	21 (5.55)	6 (3.35)	15 (7.54)	2.40	0.121***
Hyperactivity/inattention	55 (14.55)	15 (8.38)	40 (20.10)	10.41	<b>0.001***</b>
Peer problems	58 (15.34)	23 (12.85)	35 (17.59)	1.63	0.202***
Prosocial behavior	12 (3.17)	6 (3.35)	6 (3.02)	0.035	0.852***
Total score	35 (9.26)	16 (8.94)	19 (9.55)	0.001	0.979***

SD: Standard deviation; \* Student t test, \*\* Mann Whitney U test, \*\*\*Chi square test.

**Table 5.** SDQ scores of the sample based on selected variables.

Variables	Emotional problems Median (min-max)	Conduct problems Median (min-max)	Hyperactivity/inattention Median (min-max)	Peer problems Median (min-max)	Prosocial behavior Median (min-max)	Total score Median (min-max)
<b>School</b>						
MoNE public	2.0 (0-8)	1.0 (0-7)	4.0 (0-9)	2.0 (0-6)	8.0 (0-10)	9.0(1-21)
MoNE private	1.0 (0-10)	1.0 (0-9)	4.0 (0-10)	2.0 (0-8)	8.0 (3-10)	9.0(0-28)
p* value	<b>0.04</b>	0.120	0.449	<b>0.026</b>	0.360	0.368
<b>Literacy status</b>						
Illiterate	2.0 (0-9)	1.0 (0-7)	4.0 (0-10)	2.0 (0-8)	8.0 (0-10)	10 (2-28)
Literate	1.0 (0-10)	1.0 (0-9)	4.0 (0-9)	2.0 (0-7)	8.0(3-10)	8(0-28)
p* value	0.066	0.299	0.109	<b>0.017</b>	0.922	<b>0.008</b>
<b>Accompanied by an adult</b>						
Yes	2.0 (0-9)	1.0 (0-9)	4.0 (0-9)	2.0 (0-6)	8.0 (3-10)	9.0 (1-28)
No	2.0 (0-10)	1.0 (0-5)	4.0 (0-10)	2.0 (0-8)	8.0 (0-10)	8.0 (0-25)
p* value	0.176	0.821	<b>0.003</b>	0.979	0.551	<b>0.020</b>
<b>Teacher complaint</b>						
Yes	2.00(0-10)	2.00(0-9)	5.0 (0-9)	2.0 (0-6)	8.0 (3-10)	11.0 (3-28)
No	2.00(0-9)	1.0 (0-6)	4.0 (0-10)	2.0 (0-8)	8.0 (0-10)	8.0 (0-28)
p* value	0.320	<b>&lt;0.001</b>	<b>&lt;0.001</b>	0.098	0.207	<b>&lt;0.001</b>
<b>Regular hobbies</b>						
Yes	2.00(0-9)	1.0 (0-7)	4.0 (0-10)	2.0 (0-8)	8.0 (0-10)	8.0 (0-21)
No	2.00(0-10)	2.00(0-9)	4.0 (0-9)	2.0 (0-7)	8.0 (3-10)	9.0 (2-28)
p* value	0.143	<b>0.028</b>	0.058	<b>&lt;0.001</b>	<b>0.012</b>	<b>0.003</b>

\*Mann Whitney U test.

during online learning (all  $p > 0.05$ ).

The statistical data on the relationship between children's school (public or private), reading levels (literate and illiterate), adult accompaniment during online learning, teacher's complaints, regular activities/hobbies, and SDQ scores (subscales and total) are given in Table 5.

While all SDQ subscales and total scores were negatively correlated with the level of benefit from online learning (emotional problems  $p: 0.013$ , all other subscores and total

score  $p < 0.001$ ), the SDQ prosocial behavior subscale score was positively correlated ( $p < 0.001$ ).

In terms of the estimated daily extracurricular screen time (tablet/phone/computer) and the mean SDQ scores, all subscale and total scores, except the prosocial behavior subscale score differed meaningfully negatively (Emotional problems ( $p < 0.001$ ), Conduct problems ( $p: 0.022$ ), Hyperactivity/inattention problems ( $p < 0.001$ ), Peer problems ( $p < 0.001$ ), Prosocial behavior ( $p: 0.082$ ), Total scores

( $p < 0.001$ ). There was no difference in SDQ scores in terms of the subjects (educational video, social network video, movie/cartoons, online game) that the child was interested in on the tablet/phone/computer outside the online learning ( $p > 0.05$ ).

## Discussion

Online learning, although becoming increasingly prominent in recent years, has not been sufficiently explored in terms of its relationship with emotional/behavioral problems in children, whether it is suitable for every child, the identification of vulnerable groups, and the examination of risky and protective factors. With the pandemic, a suitable environment has been created for researching this issue, as the participation of all children, regardless of preference, is essential. Our study evaluated a relatively high number of children of similar age groups at the same educational level. In terms of emotional/behavioral problems, our findings indicate that girls and boys were affected in different subdomains. Illiteracy and increased extracurricular screen time were related to more negative outcomes, whereas regular off-screen activities/hobbies were associated with more positive outcomes. It was also shown that, according to the mothers' reports, online learning negatively influenced almost half of their children, and the level of complaints about online learning was associated with emotional/behavioral problems.

Online learning, while providing conveniences, has also brought along many challenges. While a meta-analysis study suggests that optimal presentation and supported online formats could be as effective as face-to-face were not able to use technology or online platforms effectively for interacting with learning outcomes for adults [17], the same has not been proven for children. Online learning requires a higher level of independence, motivation, and discipline compared to classroom learning. These conditions can pose challenges for children as they may not have fully developed these skills yet [18, 19]. In studies, more than half of children and parents have found home education and learning to be more challenging compared to the pre-pandemic period [20-22]. More than 7 out of 10 parents reported that they struggled to manage and support online learning for their children while dealing with childcare or working from home, leading to stress [21, 23]. In Fontenelle-Tereshchuk's study on parents' online learning experiences during the pandemic, it was reported that teachers were not able to use technology or online platforms effectively for interacting with students, and home was not an ideal environment for school learning [20]. In our study, regarding the challenges faced during online learning, nearly half of the mothers reported that their children easily got distracted, complained about internet and technological difficulties, and more than one-third of them mentioned having difficulties due to not being able to accompany their children during online learning. In Lao et al.'s questionnaire study applied to the parents of primary school students three weeks after the transition to online learning, the three biggest difficulties experienced in the online learning process were children's lack of focus/interest, disruption by other family members, and lack of resources [5]. Further studies on this subject, further

development of technological infrastructure and an online learning system that increases the attention of children in front of the screen and provides movement opportunities may be useful.

In Zhao et al.'s study conducted during the second week of online learning during the pandemic, it was reported that 19.3% of 1<sup>st</sup> and 2<sup>nd</sup> grade students scored above the SDQ threshold. As the grade level increased, the number of children exceeding the threshold decreased, and this rate was reported to be the highest among all students in grades 1-9. However, additional information on SDQ subscale scores could not be obtained in the study [24]. In our study, the rate of children passing the threshold level was 9.26%. The fact that our study was conducted in later periods of the pandemic and online learning may be associated with the children's adaptation to the new situation and changes in their levels of being affected.

In our study, SDQ emotional problems subscale scores were found to be higher in girls, SDQ conduct problems and hyperactivity/inattention subscales and total scores were higher in boys. Gender is an important factor influencing the mental health of children and adolescents. Although more research has been conducted on adolescents, many studies in preschool and early school-age children have shown that boys exhibit more externalizing symptoms, such as conduct problems and/or hyperactivity, while no significant gender difference was found in internalizing symptoms. Additionally, parents have reported more mental health problems in boys compared to girls [25, 26, 27]. The general consensus is that gender equality continues until early adolescence, after which internalizing symptoms become more prevalent in girls. In contrast, similar to our study, Beyer et al.'s research with 4<sup>th</sup> grade elementary school children found that externalizing disorders were more common in boys, while internalizing symptoms were more frequent in girls [28]. Although many studies during the pandemic have identified being a female adolescent as a risk factor for emotional problems [29], our knowledge about younger age groups remains limited.

In illiterate children, the SDQ total scores were significantly higher compared to literate children. It is not surprising that a literate child would find it easier to use a computer and communicate online, as compared to illiterate children. Additionally, our study found that the duration of school attendance during the previous face-to-face education period and the current online learning hours did not significantly affect emotional/behavioral problems. These findings suggest that the duration of school attendance or online learning hours does not have a pronounced effect on children's emotional/behavioral problems and that including illiterate children in a separate educational plan with support could be beneficial during this process. Further research is needed to identify at-risk children in this regard.

In Zhao et al.'s study, 61% of parents of students in grades 1-3 reported that their children required monitoring during online learning [24]. In Lau et al.'s study, 9.1% of preschool students and 14% of elementary school students were able to complete online learning lessons without parental assistance, while the remaining students needed varying levels of parental help [5]. In our study, the rate of hav-

ing an adult accompanying the child during online learning is 55%, with 71.6% of them being mothers. Children with adult accompaniment have higher SDQ hyperactivity/inattention and total scores compared to those without accompaniment. Children with attention and hyperactivity issues often face challenges with homework, making accurate recordings, making careless mistakes, struggling to maintain focus, procrastinating, and leaving tasks unfinished, more so than their peers [30, 31]. It is evident that these difficulties make it harder for children to stay on task independently during class. Therefore, it is not surprising that they may require more assistance and accompaniment during online learning. This finding may suggest that children with higher hyperactivity scores need more adult supervision and support.

Increased social isolation and the process of adapting to online learning in children have also resulted in increased screen time [32]. In a study conducted in Shanghai, involving children aged 6-17 years, it was shown that total screen time increased during the pandemic, and screen time during leisure time also extended, with approximately one-fourth of the students spending long hours in front of screens during leisure time [33]. Tso et al. reported that increased screen time during the COVID-19 pandemic was associated with worse mental and emotional well-being in children aged 6-12 years. Moreover, the amount of time spent on electronic devices for playing games was found to be negatively associated with all SDQ scale scores. The study highlighted the negative impact of prolonged and increased use of electronic devices for both gaming and learning purposes, particularly in young children, and emphasized the need to avoid excessive screen time [34]. Additionally, Moulin et al. found a significant association between emotional problems and increased screen time, while no relationship was found between hyperactivity/inattention and increased screen time [35]. In our study, a significant negative correlation was found between the estimated daily extracurricular screen time and the average SDQ scores, except for the prosocial behavior subscore. Like other studies mentioned in the literature, it is important to acknowledge that our study is also cross-sectional, which means that the relationship between screen usage and children's psychological difficulties could be bidirectional, with each potentially influencing the other [34, 35]. Furthermore, the lack of difference in emotional/behavioral problems scores based on the subjects of interest on tablets/phones/computers (educational videos, social network videos, movies/cartoons, online games) suggests that in our study age group, the duration of screen time may have a more significant impact than the specific content being engaged with. Unlike our study, a comprehensive review in the literature reported that despite the numerous conflicting findings, all screen time (online classes, social media, video games, etc.) does not have an equal impact on children [36]. The fact that our study was conducted with a younger age group may have influenced the results.

To compensate for the negative effects of screen exposure in online learning, children are recommended to engage in hobbies at home after classes, such as drawing, gardening, cooking, baking, and indoor exercises (e.g., jumping, danc-

ing, yoga) [24]. In our study, participants who regularly (always) engaged in offline activities/hobbies during online learning showed significantly more positive scores in the SDQ. This reflects the cross-sectional nature of the evaluation, making it difficult to infer whether regular activities/hobbies reduce emotional/behavioral problems or if children with fewer emotional/behavioral problems engage in more activities/hobbies. Standardized and detailed studies in this regard will provide guidance.

Our study, like all studies, has some limitations. Firstly, due to the cross-sectional and randomized design of the study, the results cannot be generalized, and a cause-effect relationship cannot be established. Additionally, the study was conducted online via electronic media due to pandemic conditions, the risk of disease transmission, and restrictions. However, given the need to maintain social distance during online learning, electronic questionnaires were the safest and most effective way to collect data from a large number of subjects in a short time. Furthermore, because participants were invited to the study through electronic means, children whose illiterate parents were not included, which may limit the generalizability of the results to the overall population. The information provided by mothers in the questions related to children using self-report scales was trusted. However, considering the ages of the participating children, parental evaluation is known to be the most appropriate method. Moreover, the inclusion of a large and almost nationwide representative sample, selecting the same age and education group (1<sup>st</sup> grade) has helped to address developmental differences. It also provided valuable insights into the challenges faced during online learning and factors that could be effective for children. Furthermore, our study was conducted during a period when the acute effects of the pandemic and lockdowns had diminished, and the adaptation period for online learning had passed. This allowed for a clearer understanding of online learning and its impact. The study also shed light on the technological and infrastructure improvements made during this time, which could contribute to more accurate conclusions regarding online learning.

## Conclusion

Our study revealed that online learning during the pandemic negatively affected nearly half of the children for various reasons. It also highlighted that gender could lead to differences in emotional/behavioral problems in early childhood. Children who cannot read and write and those with increased screen time might be at a higher risk in terms of emotional/behavioral problems. Additionally, continuing regular activities/hobbies could have a positive impact. These findings can serve as a guide for determining and directing current and future measures. In this context, tailored approaches based on each child's academic level and mental challenges can be developed, along with effective online educational methods and practices that cater to their needs. These measures can have a positive impact on the child's mental well-being. Large-scale longitudinal studies are needed to investigate the long-term relationship between online learning and emotional/behavioral problems in children.

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### Informed consent

All participants accepted to participate in the study, and written and verbal informed consent was obtained from the parents of each child.

### Ethical approval

This study was approved by the local Medical Research Ethics Committee of Kahramanmaraş Sütçü İmam University (Date: 8.2.2021, session no: 2021/05, Decision no: 07).

### Conflict of interest

The authors have no specific funding or other conflicts of interest to disclose.

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### Author contribution

The authors confirm contribution to the paper as follows: study conception and design: SCA, HA; data collection: SCA; analysis and interpretation of results: SCA, HA; draft manuscript preparation: SCA. All authors reviewed the results and approved the final version of the manuscript.

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