



Mental health of mothers with children with attention deficit hyperactivity disorder after distance learning measures during the COVID-19 pandemic

© Duygu Kaba¹, © Hande Ayraller Taner¹, © Burcu Akın Sarı¹, © Ayşegül Efe², © Beril Aydın³

¹Başkent University Faculty of Medicine, Department of Child and Adolescent Psychiatry, Ankara, Türkiye

²Ankara Etlik City Hospital, Clinic of Child and Adolescent Psychiatry, Ankara, Türkiye

³Başkent University Faculty of Medicine, Department of Pediatrics, Ankara, Türkiye

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Corresponding Author:

Duygu Kaba, M.D., Başkent University
Faculty of Medicine, Department of
Child and Adolescent Psychiatry,
Ankara, Türkiye
+90 505 230 34 44
duygukaba72@gmail.com

ORCID:

orcid.org/0000-0002-4261-8509

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ABSTRACT

Aims: This study aimed to evaluate the mental health of mothers of children with attention deficit hyperactivity disorder (ADHD) after distance learning measures during the Coronavirus disease-2019 (COVID-19) pandemic, considering factors that may influence their well-being.

Methods: In a cross-sectional design, the levels of burnout, depression, anxiety, stress, coping strategies, social support, and perceived changes in mental health among the mothers were assessed using the Maslach Burnout Inventory (MBI), Depression Anxiety Stress Scale-21 (DASS-21), Brief Coping Orientation to Problems Experienced Inventory, Multidimensional Scale of Perceived Social Support Scale, and Global Rating of Change (GRC) scale. Furthermore, the mothers completed the Atilla Turgay Scale (T-DSM-IV-S) to evaluate their perceptions of their children's ADHD and behavioral problems.

Results: Of the 72 mothers (mean age: 42.46±6.73 years, mean children age: 11.39±3.12 years), 50%, 44.4%, and 43.1% had depression symptoms, anxiety, and stress, respectively. According to the GRC, most mothers (67%) reported deterioration in mental well-being compared with the pre-pandemic period. The strongest correlations were between the subscales of T-DSM-IV-S and the total MBI score ($r=0.51$, $p<0.001$), DASS-21 score ($r=0.35$, $p=0.003$), and GRC score ($r=-0.40$, $p=0.004$), particularly with the inattention subscale. Child's attention deficit score, maternal education level, maladaptive coping level, and frequency of outdoor activities were identified as predictors of GRC.

Conclusions: This study showed that the distance learning during the COVID-19 pandemic was associated with deteriorated mental health among mothers of children with ADHD. The mother's maladaptive coping strategies, frequency of outdoor activities, education level, and attention deficit level were identified as independent predictors of deteriorated mental health in mothers.

Introduction

Attention deficit hyperactivity disorder (ADHD), a neurodevelopmental disorder characterized by distractibility, mobility, and impulsivity, is prevalent in children and adolescents (1). A limited number of studies conducted during the Coronavirus disease-2019 (COVID-19) pandemic have highlighted more dramatically increased parenting stress (2) and decreased

quality of life in parents of children with ADHD than in those of the controls (3,4). This may be due to increased home time spent with children, reduced educational support from teachers, the burden of responsibility on parents, increased family conflicts, and reduced social support. Moreover, studies conducted on extraordinary conditions such as pandemics have reported that parental stress was positively correlated with a child's ADHD



symptom severity (2,3); among ADHD symptoms, hyperactivity-impulsivity symptoms were stated to be a stronger predictor of parenting stress (5-7).

After the COVID-19 outbreak was declared a pandemic, schools in Türkiye switched to online education, and home confinement was applied for individuals under 18 years. Türkiye continued online education for a longer period than European countries and applied long-term home confinement for children. Parents of children with ADHD may be more adversely affected in Türkiye because of prolonged interaction with their children and the increasing challenges faced by children with ADHD during home confinement. However, the mental health of children with ADHD and their parents has not been adequately evaluated during the distance learning process stemming from the pandemic in Türkiye.

While previous studies provide valuable insights, it remains unclear how specific factors contribute to the deterioration of parental mental health in individuals with ADHD, as well as the relationship between parental mental health and the child's ADHD symptoms during distance learning. This study differs from other studies in the literature in that it also addresses various factors that may be related to the mother's mental health, such as the level of social support, coping strategies, and the child's behavioral problems. Taking these factors into consideration, the present cross-sectional study aimed to investigate the following aspects through self-reports from mothers during the home confinement and distance learning imposed by the pandemic: (a) levels of maternal general distress and burnout, (b) increasing problems of children with ADHD, (c) the relationship between maternal mental health and parental coping strategies, perceived social support, and the severity of the child's ADHD symptoms, and (d) risk factors associated with deteriorated maternal mental health. The primary outcomes of the study were focused on the mental health of mothers with children with ADHD, encompassing burnout, depression, anxiety, stress, and perceived changes in mental health associated with the pandemic. The secondary outcomes included exploring various factors that may impact the well-being of these mothers, including coping strategies, perceived social support, the severity of their children's ADHD and behavioral problems, and sociodemographic factors.

Methods

Participants and the procedure

This cross-sectional study included mothers of children with ADHD during the distance learning period. The data were collected between May 15 and July 15, 2021, when 1-year distance learning and home confinement continued for individuals under 18 years of age. The data were registered during follow-up visits to the Child and Adolescents Clinic of

the Faculty of Medicine, Başkent University Hospital. A non-probability convenience sampling technique was used in this study. The inclusion criteria for participant selection were as follows: having a child under the age of 18 years diagnosed with ADHD and residing with the child. The exclusion criteria encompassed the presence of intellectual disability, autism spectrum disorder, specific learning disability, psychotic disorder, bipolar mood disorder, or chronic physical diseases (such as cancer, diabetes, epilepsy, etc.) in the child.

The ADHD diagnosis of the children was reconfirmed by the clinician according to the Diagnostic and Statistical Manual of Mental Disorders, 5th ed., Text Revision (8) criteria. The Wechsler Intelligence Scale for Children (fourth edition) was requested in cases suspicious for an intellectual disability (9). During the specified period, 184 mothers with children with ADHD visited the outpatient clinic. Among this group, 119 mothers met the research criteria, and 81 voluntarily agreed to participate. After obtaining verbal and written informed consent from the parents who met the inclusion criteria and voluntarily agreed to participate in the study, the mothers completed the questionnaires. Of the 81 mothers who filled out the research questionnaire, 9 participants with missing data were excluded, and the final analysis included 72 participants.

Assessments

Sociodemographic form: The form created by the authors consists of parent-proxy reports regarding the sociodemographic characteristics and medical history of all children in the family, types and duration of medication used by children, COVID-19 backgrounds of parents, frequency of outdoor activities such as tracking and exercise during the last year, and any changes in the children's behavioral problems.

Maslach Burnout Inventory (MBI): This scale consists of three subscales: emotional exhaustion, depersonalization, and lack of personal accomplishment (10). The reliability and validity of the Turkish version were evaluated (11) and adapted to parents (12). Each of 22 items in this scale is scored from 0 to 4. The analysis involved the general burnout score derived from reversing the scoring of the items in the personal accomplishment subscale. As the total score on the scale increased, burnout also increased. In the current study, the data were recorded and analyzed as continuous variables. The Cronbach's alpha reliability coefficients of the emotional exhaustion, depersonalization, and personal accomplishment subscales were 0.86, 0.69, and 0.72, respectively.

Depression Anxiety Stress Scale-21 (DASS-21): The scale was developed in 1995 (13), and the Turkish version was validated (14). Each item is scored between 0 and 3, and the total score ranges between 0 and 63. The cut-off scores of the Turkish version for depression, anxiety, and stress are 5, 4, and 8, respectively. In a recent study, the DASS-21 total score was

found useful to determine the general distress score (15). As the total score on the scale increased, the level of general distress also increased. In the current study, the data were recorded and analyzed as continuous variables. The Cronbach's alpha was 0.95.

Brief Coping Orientation to Problems Experienced Inventory (Brief COPE): Brief COPE developed by Carver consists of 14 subscales, each containing two items (16). Each item is scored between 1 and 4. Psychometric validation of the Turkish version was performed (17). The score obtained from the scale also reflects the frequency of the use of that coping strategy. There are different categorizations of scale items, among which the most commonly used are adaptive versus maladaptive and problem-focused versus emotion-focused (18). In the current study, the subscales active coping, planning, emotional support, instrumental support, positive reframing, acceptance, religion, and humor were grouped as "adaptive coping strategies", whereas venting, denial, substance use, behavioral disengagement, self-distraction, and self-blame were grouped as "maladaptive coping strategies". The data were recorded and analyzed as continuous variables. The Cronbach's alpha was 0.84.

Multidimensional Scale of Perceived Social Support Scale: The scale consists of 12 items with a total score ranging between 12 and 84 (19). High scores obtained from the scale indicate high perceived support. Psychometric validation of the Turkish version was performed (20). In the current study, the data were recorded and analyzed as continuous variables. The Cronbach's alpha was 0.93.

Global Rating of Change (GRC) Scale: To evaluate the perceived change in the mental health of mothers, a single question was asked: "How would you rate your current mental health compared with your situation before the COVID-19 pandemic?" Responses were as follows: 1 = "much worse", 2 = "worse", 3 = "minimally worse", 4 = "no change", 5 = "minimally improved", 6 = "improved", and 7 = "much improved". This one-question scale was previously shown to be easy to understand by the participants (21). It was also used in another study to assess changes in mental health in the COVID-19 study (22). In the current study, those who scored between 1 and 3 were grouped as "low GRC" (for deteriorated mental health), and those who scored between 4 and 7 as "high GRC" (for improved mental health/no change).

Atila Turgay DSM-IV Based Screening and Evaluation Scale for Behavioral Disorders in Children and Adolescents (T-DSM-IV-S): T-DSM-IV-S is a 41-item scale for ADHD, developed by Atila Turgay based on the DSM-IV criterion, and psychometric validation was performed (23). Each item is scored between 0 = "not at all" and 3 = "very much". It consists of attention deficit (9 items), hyperactivity/impulsivity (9 items), oppositional defiant disorder (ODD) (8 items), and conduct

disorder (CD) (15 items) subscales. In the current study, mothers completed this scale, which can be completed by either parents or teachers (23). The data were recorded and analyzed as continuous variables. The Cronbach's alpha was 0.94 in this study.

Ethics

The study was approved by Başkent University, Medical and Health Sciences Research and Ethics Committee (project number: KA21/223, date: 28.04.2021). This study was conducted in accordance with the principles of the Helsinki Declarations revised in 2013.

Statistical Analysis

Power analyses (G power software) indicated that 67 participants would provide 80% statistical power, with an alpha of 0.05, for a medium effect size of $r=0.3$ (for correlational analyses). Statistical Package for Social Sciences (SPSS) 25.0 [(SPSS) Armonk, New York: IBM Corp.] software was used for the analysis. The distribution of the data was examined with histogram graphics and skewness and kurtosis values. After descriptive statistical analysis, the groups were compared using the independent sample t-test or the Pearson chi-square and Fisher's exact tests. The homogeneity of the variances was interpreted according to the Levene statistical results. Correlations between the scores from the scales were analyzed using Pearson correlation coefficients. Finally, to determine the factors that predicted deteriorated mental health, the variables with $p<0.1$ in the independent sample t-test, Pearson's chi-squared test, or Fisher's exact test were included in the logistic regression model with the 'Enter' method. In all analyses, $p<0.05$ was considered statistically significant.

Results

Descriptive statistics

The mean age of mothers was 42.46 ± 6.73 years (minimum-maximum=28-58 years). The majority (89%) were married and had a high education status (12.5% primary/secondary school, 19.4% high school, 68.1% college and over education). Approximately 50% of mothers were public employees, 29% were retired or housewives, and the remaining 21% were tradesmen. Regarding the psychiatric and medical background, 7% ($n=5$) of the mothers had a mental illness (4 depression, 1 anxiety disorder); 16.7% of them had at least one chronic disease such as hypertension or diabetes mellitus. The descriptive features of the participants are summarized in Table 1.

The mean age of children with ADHD was 11.39 ± 3.12 years (minimum-maximum=6-17 years), whereas the mean diagnosis age was 7.65 ± 2.19 years. A vast majority of the children (73.6%) were males. In the scope of ADHD type, the most common type

Table 1. Comparison of maternal socio-demographics and clinical features of children with ADHD according to GRC score				
	All mothers (n=72)	GRC score ≥4 (n=24)	GRC score <4 (n=48)	p
Age, n (%)				
<43 years	40 (55.6)	15 (37.5)	25 (62.5)	0.402 ^a
≥43 years	32 (44.4)	9 (28.1)	23 (71.9)	
Marital status, n (%)				
Married	64 (88.9)	22 (34.4)	42 (65.6)	0.710 ^b
Divorced/separated	8 (11.1)	2 (25.0)	6 (75.0)	
Education status, n (%)				
Senior high school or below	23 (31.9)	12 (52.2)	11 (47.8)	0.020^a
College education or above	49 (68.1)	12 (24.5)	37 (75.5)	
Occupation, n (%)				
Healthcare worker	8 (11.1)	2 (25.0)	6 (75.0)	0.823 ^a
Other public employees	28 (38.9)	11 (39.3)	17 (60.7)	
Tradesman/private sector	15 (20.8)	5 (33.3)	10 (66.7)	
Retired/housewife	21 (29.2)	6 (28.6)	15 (71.4)	
Income status, n (%)				
Very low (0-2999 TRY)	8 (11.1)	2 (25.0)	6 (75.0)	0.804 ^a
Low (3000-5999 TRY)	17 (23.6)	7 (41.2)	10 (58.8)	
Moderate (6000-8999 TRY)	18 (25.0)	5 (27.8)	13 (72.2)	
High (>9000 TRY)	29 (40.3)	10 (34.5)	19 (65.5)	
Working status in pandemic, n (%)				
Not working	37 (51.4)	12 (32.4)	25 (67.6)	0.932
Working	35 (48.6)	12 (34.2)	23 (65.8)	
Psychiatric background, n (%)				
Present	5 (6.9)	2 (40.0)	3 (60.0)	0.544 ^b
Absent	67 (93.1)	22 (32.8)	45 (67.2)	
Medical background, n (%)				
Present	12 (16.7)	1 (8.3)	11 (91.7)	0.051 ^b
Absent	60 (83.3)	23 (38.3)	37 (61.7)	
Child number under 12-year-old, n (%)				
<2	53 (73.6)	20 (37.7)	33 (62.3)	0.186 ^a
≥2	19 (26.4)	4 (21.1)	15 (78.9)	
Psychiatric disorders of other children, n (%)				
Present	4 (5.6)	0 (0.0)	4 (100.0)	0.294 ^b
Absent	68 (94.4)	24 (35.3)	44 (64.7)	
Medical disorders in other children, n (%)				
Present	2 (2.8)	0 (0.0)	2 (100.0)	0.549 ^b
Absent	70 (97.2)	24 (34.3)	46 (65.7)	
COVID-19 background, n (%)				
Yes	15 (20.8)	7 (46.7)	8 (53.3)	0.218 ^a
No	57 (79.2)	17 (29.8)	40 (70.2)	
Quarantine background, n (%)				
Yes	17 (23.6)	6 (35.3)	11 (64.7)	0.844 ^a
No	55 (76.4)	18 (32.7)	37 (67.3)	
Loss of loved one due to COVID-19, n (%)				
Yes	5 (6.9)	1 (20.0)	4 (80.0)	0.659 ^b
No	67 (93.1)	23 (34.3)	44 (65.7)	
Outdoor activities, n (%)				
Less than 1 per week	50 (69.4)	12 (24.0)	38 (76.0)	0.011^a
At least 1 day a week	22 (30.6)	12 (54.5)	10 (45.5)	

Significant p values are shown in bold. ^aPearson χ^2 test, ^bFisher's exact test was used when expected cases were <5 in two-group comparisons. ADHD: Attention deficit and hyperactivity disorder, GRC: Global Rating of Change Scale, TRY: Turkish Lira, COVID-19: Coronavirus disease-2019

was the mixed type (%65), followed by attention-deficit type (%31) and hyperactivity type (%4), respectively. In addition, 64% of children have at least one comorbid psychiatric disorder. The most common psychiatric comorbidity was ODD (43%), whereas anxiety disorder (14%), conduct disorder (7%), tic disorder (4%), and depression (3%) were less frequent. Data on other characteristics that define children with ADHD are displayed in Table 2.

Comparison of children's symptoms with those in the pre-pandemic period according to mothers' self-reports

The majority of parents (58%) reported a deterioration in their children's mental health compared with the pre-pandemic period, manifested by an increase in symptoms of irritability (53%), distraction (46%), and agitation/impulsivity (44%). There was also a significant increase in screen time outside online lessons (86%). A significant portion of parents/mothers stated that their children's academic success (53%), fulfilling their responsibilities such as doing homework (64%), and total sleep time (40%) decreased, whereas the parent-child arguments (58%) increased compared to the pre-pandemic period. However, few of the mothers reported that their children's mental health was better (11%) than that in the pre-pandemic period and that they adapted well to distance learning (18%).

Associated factors of maternal burnout, general distress levels, and deteriorated mental health

The mean MBI score of the mothers was 23.39 ± 11.80 , and the mean DASS-21 score was 15.51 ± 12.18 . Based on the cut-off scores for DASS-21, the prevalence of clinically significant depression, anxiety, and stress symptoms in mothers was 50%, 44.4%, and 43.1%, respectively. According to the GRC, most mothers (67%) reported experiencing a deterioration in their mental well-being compared with the pre-pandemic period. Based on the reported reasons, the highest percentage (79%) was attributed to the increasing difficulties faced by children with ADHD, followed by restrictions on social activities (73%), COVID-19 anxiety (65%), and economic hardships (33%). In addition, those with low GRC had higher levels of education ($p=0.020$) and were less able to go out for social sports activities ($p=0.011$) than those with high GRC (Table 1). The results of the analyses, which compared individuals with low and high GRC scores and their children in terms of clinical and sociodemographic characteristics, as well as scores on other scales, are presented in Tables 1-3. GRC showed a moderately negative correlation with both MBI and DASS-21 ($r=-0.52$, $p<0.001$; $r=-0.56$, $p<0.001$, respectively). The strongest correlation was observed

Table 2. Characteristics of children with ADHD and their comparison according to GRC score

	All children (n=72)	GRC score ≥ 4 (n= 24)	GRC score <4 (n=48)	p
Age, n (%)				
<11 years	30 (41.7)	12 (40.0)	18 (60.0)	0.310 ^a
≥ 11 years	42 (58.3)	12 (28.6)	30 (71.4)	
Sex, n (%)				
Female	19 (26.4)	6 (31.6)	13 (68.4)	0.850 ^a
Male	53 (73.6)	18 (34.0)	35 (66.0)	
Education status, n (%)				
Primary school	28 (38.9)	12 (42.9)	16 (57.1)	0.305 ^a
Secondary school	26 (36.1)	6 (23.1)	20 (76.9)	
Senior high school	18 (25.0)	6 (33.3)	12 (66.7)	
ADHD diagnoses age, n (%)				
<7 years	24 (33.3)	11 (45.8)	13 (54.2)	0.112 ^a
≥ 7 years	48 (66.7)	13 (27.1)	35 (72.9)	
ADHD type, n (%)				
Attention deficit type	22 (30.5)	7 (31.8)	15 (68.2)	0.994 ^a
Mixed type	47 (65.3)	15 (31.9)	32 (68.1)	
Medication for ADHD, n (%)				
Methylphenidate	47 (65.3)	16 (34.0)	31 (66.0)	0.342 ^b
Atomoxetine	5 (6.9)	3 (60.0)	2 (40.0)	
Comorbid psychiatric disorders, n (%)				
Present	46 (63.9)	12 (25.5)	34 (74.5)	0.083 ^b
Absent	26 (36.1)	12 (48.0)	14 (52.0)	

^aPearson χ^2 test, ^bFisher's exact test was used when expected cases were <5 .

ADHD: Attention deficit and hyperactivity disorder, GRC: Global Rating of Change Scale

Table 3. MBI, DASS-21, MSPSS, Coping styles, and T-DSM-IV-S scores based on GRC score

	GRC score ≥ 4 (n=24)	GRC score < 4 (n=48)	p
MBI score, mean\pmSD	14.79 \pm 9.73	27.69 \pm 10.36	<0.001
DASS-21 score, mean\pmSD	6.33 \pm 6.35	20.10 \pm 11.83	<0.001
MSPSS score, mean\pmSD	61.33 \pm 18.51	61.72 \pm 17.92	0.931
Coping styles			
Adaptive strategies score, mean \pm SD	41.08 \pm 10.29	43.23 \pm 6.94	0.298
Maladaptive strategies score, mean \pm SD	21.46 \pm 4.77	26.38 \pm 4.55	<0.001
T-DSM-IV-S			
Inattention score, mean \pm SD	12.67 \pm 5.21	17.29 \pm 5.93	0.002
Hyperactivity/impulsivity score, mean \pm SD	11.88 \pm 7.78	12.21 \pm 7.55	0.862
ODD score, mean \pm SD	9.58 \pm 6.47	11.73 \pm 5.94	0.165
CD score, mean \pm SD	1.46 \pm 2.40	2.67 \pm 3.75	0.102

Significant p values are shown in bold.

SD: Standard deviation, GRC: Global Rating of Change Scale, MBI: Maslach Burnout Inventory, DASS-21: Depression Anxiety Stress Scale-21, MSPSS: Multidimensional Scale of Perceived Social Support Scale, T-DSM-IV-S: Atilla Turgay DSM-IV Based Screening and Evaluation Scale for Behavioral Disorders in Children and Adolescents, ODD: Oppositional defiant disorder, CD: Conduct disorder

Table 4. Correlation coefficients between scales

	1	2	3	4	5	6	7	8	9	10
1. MBI score	-									
2. DASS-21 score	0.603**	-								
3. GRC score	-0.523**	-0.559**	-							
4. MSPSS score	-0.220	-0.324**	0.096	-						
5. Adaptive COPE score	0.074	-0.047	-0.020	0.327**	-					
6. Maladaptive COPE score	0.424**	0.603**	-0.382**	-0.073	0.420**	-				
7. Inattention score	0.514**	0.346**	-0.404**	-0.142	0.130	0.325**	-			
8. Hyperactivity/impulsivity score	0.352**	0.145	-0.093	-0.184	-0.072	0.113	0.589**	-		
9. ODD score	0.487**	0.261*	-0.241*	-0.331**	-0.001	0.197	0.571**	0.552**	-	
10. CD score	0.333**	0.090	-0.240*	-0.281*	0.024	0.056	0.333**	0.321**	0.569**	-

Bold values are significant. *p<0.05, **p<0.01.

MBI: Maslach Burnout Inventory, DASS-21: Depression Anxiety Stress Scale-21, GRC: Global Rating of Change Scale, MSPSS: Multidimensional Scale of Perceived Social Support Scale, ODD: Oppositional defiant disorder, CD: Conduct disorder

between the subscales of T-DSM-IV-S and the total scores of MBI, DASS-21, and GRC scales, particularly with the inattention subscale ($r=0.51$, $p<0.001$; $r=0.35$, $p=0.003$; $r=-0.40$, $p=0.004$, respectively). Correlation coefficients between the scales are provided in Table 4.

Predictors of maternal mental health

Logistic regression analysis was applied to determine the risk factors that predict deteriorated mental health from the pandemic in the mothers of children with ADHD. GRC was determined as the dependent variable (1 = low; 0 = high), and the independent variables were education level (College education or above = 1; Senior high school or below = 0), medical background of the mother (1 = present; 0 = absent), frequency of going out (1 = at least 1 day per week; 0 = less than 1 per week), maladaptive coping score, comorbid psychiatric disorder in child (1 = present; 0 = absent), and inattention

subscale score based on T-DSM-IV-S. Before the analysis, the logistic regression analysis assumptions were tested. Education level [adjusted odds ratio (AOR)=5.12, 95% confidence interval (CI)=1.19-21.99, $p=0.028$], frequency of outdoor activities (AOR=0.22, 95% CI=0.06-0.83, $p=0.025$), maladaptive coping score (AOR=1.31, 95% CI=1.10-1.57, $p=0.003$), and inattention subscale score (AOR=1.13, 95% CI=1.0-1.27, $p=0.045$) were independently associated with low GRC. Education level was noted as the strongest predictor among these variables (Table 5). There was no significant relationship found between the medical background of the mother (AOR=0.10, 95% CI=0.1-1.05, $p=0.054$), the presence of comorbid psychiatric disorder in the child (AOR=1.39, 95% CI=0.19-10.17, $p=0.744$), and GRC. The regression model explained the variance in the GRC between 36.5% (Cox & Snell R^2) and 50.7% (Nagelkerke R^2), [$\chi^2=32.67^{(4)}$, $p<0.001$].

Table 5. Logistic regression analysis to explore the variables independently associated with low GRC

	OR (95% CI)	p
Education status (1: College education or above)	5.12 (1.19-21.99)	0.028
Medical background of the mother (1: Present)	0.10 (0.10-1.05)	0.054
Outdoor activities (1: At least 1 day a week)	0.22 (0.06-0.83)	0.025
Cope maladaptive score	1.31 (1.10-1.57)	0.003
Comorbid psychiatric disorders in child (1: Present)	1.39 (0.19-10.17)	0.744
Inattention score	1.13 (1.00-1.27)	0.045

Significant p values are shown in bold.
OR: Odds ratio, CI: Confidence interval, GRC: Global Rating of Change Scale

Discussion

One noteworthy aspect of this study is its distinction as one of the rare studies that uniquely focuses on mothers who have children with ADHD during distance learning. Moreover, this is the first published study in Türkiye to investigate this population from this perspective. Our findings showed that distance learning and home confinement are associated with deteriorated mental health in children with ADHD but also in their mothers. The mother's maladaptive coping strategies, frequency of outdoor activities, education level, and attention deficit level were identified as independent predictors of deteriorated mental health in mothers.

According to a recent study, children with ADHD exhibited shorter attention spans during distance learning, leading to increased academic challenges specifically for these students (24). A meta-analysis study has indicated that children with ADHD are facing disproportionate and adverse effects on a global scale during the pandemic (25). Furthermore, studies have highlighted an increase in ADHD symptoms (25-27). Our findings suggest that symptoms of inattention, as opposed to symptoms of conduct and hyperactivity/impulsivity, have a stronger association with the mental health of mothers who have children with ADHD. Furthermore, as the severity of inattention symptoms increases, maternal levels of burnout and general distress also increase. These results can be attributed to the demands of distance learning, which necessitate heightened attention and parental support. Parents of children with higher levels of inattention symptoms may encounter difficulties in providing sufficient support in this context.

One study conducted with parents of children with ADHD during the COVID-19 pandemic identified the primary challenge faced by children in distance learning as difficulties in maintaining focus and motivation (28). Furthermore, parents encountered substantial obstacles in effectively balancing the demands of distance learning with their work responsibilities (28). Another study revealed that parents expressed feelings of inadequacy in meeting the educational needs of their children with ADHD during the distance education process, which subsequently led to heightened experiences of frustration and guilt (29).

Consistent with our findings, Yousef et al. (30) identified symptoms of depression (53.7%), anxiety (61%), and elevated stress levels (53.7%) among a significant proportion of mothers with children with ADHD.

In response to stressful events, individuals often seek social support and use various coping strategies to alleviate psychological distress (31). However, our study findings indicate a stronger association between maladaptive coping strategies and parental mental health, which contradicts the significance of social support and adaptive coping strategies. These results are consistent with the findings of Achterberg et al. (32) and provide additional support for this notion. Achterberg et al. (32) have posited that, in contrast to other disaster situations, the "stay-at-home" measures implemented during the pandemic may lead to reduced anticipation of social support among individuals. However, it was determined that going out less than once a week for physical activity was a risk factor for mothers with an ADHD child, which is consistent with the findings of a previous study (33). According to Merrill et al. (34), these parents require support for distance learning, and they proposed a behavioural parent training program as a potentially beneficial intervention.

In the current study, the education level of the mother was the strongest predictor of deteriorated mental health during the pandemic. The risk of deteriorated mental health was 5.1 times higher for university or higher graduate individuals than for those with a lower education level. This finding is in contrast to pre-pandemic studies, which reported no significant relationship between education level and the mental well-being of mothers of children with ADHD (35,36). Another study conducted with mothers of children with developmental disabilities during the pandemic reported that those with higher education levels experienced more parenting stress (37). These results suggest that more educated parents may have more difficulties adapting to the increased needs of parenting in the distance learning process.

Study Limitations

The findings of this study should be evaluated within some limitations. The critical limitation of the current study is the

absence of data on the mental health status of mothers and children in the pre-pandemic period, which makes it difficult to discriminate the core impact of the pandemic and distance learning conditions on the obtained results. Second, the cross-sectional design of the study precludes the establishment of a causal relationship between distance learning in children with ADHD and the deterioration of parental mental health. Third, fathers were not included in the study because we intended to explore mothers as central care providers for children with ADHD in the local context. Fourth, due to the differences in economic, social, and cultural factors across countries, in the measures taken during the pandemic, the results may not be generalized to other populations.

Conclusion

In conclusion, the results indicate that distance learning during the COVID-19 pandemic is associated with deteriorated mental health among mothers with children with ADHD. The study identified several independent factors that predict deteriorated maternal mental health, including maladaptive coping strategies, frequency of outdoor activities, education level, and severity of attention-deficit symptoms. In accordance with the results, parents may be informed about appropriate coping strategies, and mental health professionals should closely monitor the mental health of both children and parents during distance learning. This highlights the imperative of engaging mental health professionals and educators in multidisciplinary planning to develop distance learning programs and strengthen home support systems for this vulnerable group. Future studies incorporating larger sample sizes, longitudinal designs that encompass both children and fathers and comparison groups will provide a more comprehensive understanding of the psychological impacts of online education experiences on disadvantaged children and their parents.

Ethics

Ethics Committee Approval: The study was approved by Başkent University, Medical and Health Sciences Research and Ethics Committee (project number: KA21/223, date: 28.04.2021).

Informed Consent: All study participants provided written informed consent.

Authorship Contributions

Concept: D.K., H.A.T., B.A.S., A.E., Design: D.K., H.A.T., B.A.S., B.A., Data Collection or Processing: DK., Analysis or Interpretation: D.K., Literature Search D.K., H.A.T., B.A.S., A.E., B.A., Writing DK., H.A.T., B.A.S., A.E., B.A.

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