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The relationship between pathological internet use and psychiatric difficulties in adolescents during COVID-19 pandemic

Didem Ayyıldız[1], Funda Gümüştaş[2]

[1]Department of Child and Adolescent Psychiatry, Bursa Dörtçelik Pediatric Hospital, Bursa, Turkey; [2]Department of Child and Adolescent Psychiatry, Medeniyet University Training and Research Hospital, Istanbul, Turkey

ABSTRACT

Objectives: Internet addiction has been attracting widespread interest due to the increase in screen time related to lectures, decrease in social activities and spending more time at home due to the education restriction all over the world. It was aimed to determine the psychiatric difficulties for before pandemic period and distance education period, separately and to evaluate the relationship between adolescents' pathological internet usage and difference in psychiatric difficulties.

Methods: Four hundred thirty-eight adolescents aged 11-17 years, secondary and high school students were included in the study. An online survey was created consists of "Young Internet Addiction Test-brief form" (IAT), "Strengths and Difficulties Questionnaire" (SDQ) and researcher form using Google forms application. Youths completed the SDQ retrospectively for two separate time points: during the school restriction period and before the pandemic.

Results: According to the results of our study, the number of changed areas (sleep, eating habits, leisure/social/physical activities) (B = 3.071, $p < 0.001$) and the change in SDQ-Peer relationship subscale score (B =1.193, $p = 0.019$) were among the factors significantly predict pathological internet use levels, respectively.

Conclusions: Studies enable understanding the relationship between pathological internet usage and psychiatric difficulties would be useful for the organization of preventive interventions in case similar outbreaks occurred in the future.

Keywords: COVID-19, pandemic, internet addiction, adolescent, psychiatric difficulties

Due to the pandemic that has been experienced all over the world for about 1.5 years, social life has been greatly restricted, and works, meetings, shopping and even education have begun to be made over the internet. In addition to the numerous benefits of technological devices and the internet, which is increasingly set to become an essential part of our daily lives, it has commonly been discussed that excessive use of internet is responsible for academic/family domain issues and medical/physical or psychological problems [1, 2]. Although the internet provides many opportunities for disadvantaged children (poverty, ethnicity,

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Address for correspondence: *Didem Ayyıldız, MD., Bursa Dörtçelik Pediatric Hospital, Department of Child and Adolescent Psychiatry, Ertuğrul District, Doğan Avcıoğlu Street No:7, 16120 Nilüfer, Bursa, Turkey. E-mail: didemayyldz@gmail.com, Phone: +90 224 275 20 00*

gender), it has also hazardous content that might be inappropriate for the child's development or leading to risky behavior [3, 4]. Pathological internet use has become a critical issue regarding public health, considering that 1/3 of internet users all over the world are under the age of 18.

It is well-known that the internet could be used by individuals to cope with stress, to relax or to communicate more easily due to the anxiety in social situations. It is also possible that children and adolescents with psychiatric disorders such as Depressive Disorder, Anxiety Disorder or attention deficit hyperactivity disorder, who use internet for short-term relaxation [5], easier communication or a relatively better focusing [6, 7], might lose control over the internet. Various explanations have been given for the frequent co-morbidity of pathological internet use with psychiatric disorders. The explanations were suggested such as psychiatric disorders have a role on either onset or maintain internet use, that excessive use of the internet deteriorates the course of psychiatric disorders, or that both occur with common etiological mechanisms. Studies, evaluating the relationship between internet addiction and co-morbid psychiatric disorders are mostly cross-sectional, which is insufficient to explain the causal relationship between them.

In recent years, including before pandemic, a growing body of literature has examined excessive internet use /internet addiction and related psychological factors. One of the factors, that was commonly emphasized associated with the internet/technological device overuse in the studies regarding this field, has been the time spent on the internet [8]. During the restrictions due to the pandemic, the length of time that adolescents are required to be online, including education, and therefore the risk of internet addiction has increased [9]. Studies on the long-term negative effects of the COVID-19 pandemic crisis we are experiencing as the whole world on adolescent mental health are required as such a crisis could be prolonged or repeated [10]. Most studies evaluating related factors with problematic internet use have only focused on, changes in sleep and eating habits, and quality of life in adults and adolescents during the pandemic, but not much is known about differences regarding psychiatric symptom levels between before and during the pandemic.

The aim of this study was to evaluate the difference in psychiatric difficulties before and after the pandemic and to assess the relationship of this difference with internet excessive use.

METHODS

Participants and Procedure

Adolescents aged 11-17, living in Bursa, a big city in the west of Turkey and studying 5th, 6th, 7th, 9th, 10th and 11th levels were recruited for our study. 8th and 12th grade students were excluded because they continued face-to-face education during the pandemic restriction period. Students from a secondary school and a high school in the Nilüfer district of Bursa were invited to participate to the study. The necessary permissions for the study were obtained from Bursa State Hospital Clinical Research Ethics Committee (date 02.06.2021 and number 2021-10/11) and T.C. Bursa Provincial Directorate of National Education (date 07.10.2021 and number 34082522). This study has been carried out in accordance with Declaration of Helsinki.

Adolescents were asked to fill out a detailed form prepared by the researcher, which evaluates the sociodemographic characteristics, as well as the technical devices/internet usage areas and durations, changes in eating, sleeping habits, physical activity levels, hobbies and socializing activities. (for two separate times, before the pandemic and during the school restriction period). In addition to this form, participants were asked to fill out two scales. An on-line survey was created consists of "Young Internet Addiction Test-short form" (IAT), "Strengths and Difficulties Questionnaire" (SDQ) and researcher form using Google forms application. The questionnaires were distributed to the students 15-31 of October in 2021 by their school counselor via WhatsApp. All the scales took approximately 10 minutes in total. Responses of the participants were automatically stored on the Google drive storage.

Measures

Strengths and Difficulties Questionnaire (SDQ)

SDQ is a short scale used in order to screen emotional and behavioral problems with a self-report form for ages 11-18. The scale consists of 5 subscales: Conduct Problems, Emotional Problems, Attention Deficit

and Hyperactivity, Peer Relationships and Prosocial Behaviors. A mean score can be obtained for each subscale, as well as the "Total Difficulty Score" can be calculated with the sum of the first four. Turkish validity and reliability study of the scale was made by Güvenir *et al*. [11]. Authors have suggested that SDQ had a high internal consistency except the peer problem scale. In addition to being short and practical, it is useful among the tools developed for similar purposes, as it contains items that question positive areas and contributes to the evaluation of the current strength of the youth. The SDQ scales were filled for two time points, before the pandemic and during the face-to-face education restriction, in our study.

Young Internet Addiction Test (IAT)-Brief Form

It is used to assess the youth's internet usage. Young *et al*. [12] created the Internet Addiction Test (IAT) by adapting features common to all addictions such as excessive use by ignoring basic needs, needing to use more and more (tolerance), negative emotions (anger, nervousness) in lack of internet, continuing to use the internet even though it makes life difficult. The study, in which the brief form of the scale developed by Pawlikowski *et al*., was used in university students and adolescents in our country, has showed that the Young Internet Addiction Test is a valid and reliable tool for our culture as well [13]. Explanatory factor analysis indicated that the scale explained 39.52% of the total variance in university students and 48.9% of that in adolescents. The authors have claimed that Young IAT-brief form Cronbach's alpha coefficient was found as .91 in university students and .86 in adolescents. Correlation coefficient for test-retest reliability was found as .93 in university students and .86 in adolescents. Although the scale has no cut-off value, high scores indicate a high level of internet addiction.

Statistical Analysis

The Statistical Package for the Social Sciences (version 20) program was used to analyze the data. Descriptive statistics are shown as mean-standard deviation or frequency (%). The data obtained for two time points, pre-pandemic and distance education period, were compared using the Wilcoxon Signed-Rank test. Mann Whitney U test was performed to explore differences in the scores of psychiatric difficulty areas according to the changes in sleep, eating habits, the time allocated to daily physical activity/leisure activities/social activities during school restriction (two separate groups: change is or not in the eat and sleep habits, leisure activities, social activities; decrease is or not in the physical activities). The comparison of the restriction period-SDQ subscale scores and IAT total scores between two groups set on the basis of their education preferences was also made using the student t test. The relationship among the variables: age, monthly income and change in the SDQ subscale scores between before the pandemic and school restriction time, and the IAT total score were evaluated by Spearman correlation analysis. Subtracting the score for pre-pandemic from the school restriction time score, it was obtained the score of "the change in SDQ subscales". Whether there is an alteration in the sleep and eating habits, leisure activities, social activities and a decrease in physical activities which are actually nominal variables were accepted as continuous variables in our study. The sum of the scores was expressed as "number of changed areas". Correlations between SDQ change scores and this new variable, "number of changed areas" were also examined by Spearman Correlation analysis. Finally, the variables that might influence IAT total scores were evaluated by using hierarchical linear regression analysis. The independent variables were gender and number of changed areas in the first step and the changes in the SDQ subscales (conduct, emotional and peer relationship) were in the second step. Significance was set at $p < .05$.

RESULTS

A total of 462 adolescents agreed to participate to the study and completed the survey. Since 24 of them significantly missed completing the questionnaire, the sample was composed of 438 adolescents with a mean age of (14.15 ± 2.23 years). Two-hundred and twenty two of 438 participants (50.7%) were girls; 216 (49.3%) were boys.

The answers given to the questionnaire prepared by the researcher were evaluated in order to detect the sociodemographic variables that might be associated with excessive use of internet. One of the questions, asked in the researcher survey was how many hours per day the participants spent with the internet/tech-

nological devices apart from online education. According to answers given for the pre-pandemic, 35.8% of the participants (142 of 397) stated that they spent less than 2 hours, 37.5% (n = 149) 2-4 hours, 16.4% (n = 65) 4-6 hours, 10.1% (n = 40) spent more than 6 hours with internet/technological devices. In the period when face-to-face education was restricted, it was stated that 23.2% of them (92 of 397) used the internet for less than 2 hours, 30.7% of them (n = 122) for 2-4 hours, 21.4% of them (85) for 4-6 hours, and 24.4% of them (n = 97) for more than 6 hours.

Regarding their sleep duration in a day, 4% (16 of 397) stated that they slept less than 5 hours in a day, 25.7% (n = 102) slept 5-7 hours, 51.6% (n = 205) slept 7-8 hours, 18.4% (n = 73) slept more than 8 hours. When asked how much time they spent on physical exercise before the pandemic, 33.3 percent (132 of 396) indicated less than 30 minutes, 31.8 percent (n = 126) stated 30 minutes to an hour, 20.2 percent (n = 80) replied 1-2 hours, and 14.6 percent (n = 58) said more than 2 hours. According to the answers, 93.4%of the participants (370 of 396) had pre-pandemic leisure activities and 89.1% of them (353 of 396) were spending time with their friends before the pandemic.

Changes in sleep, eating habits, physical activity, leisure time and social activity levels compared to before pandemic were evaluated at the time of education restriction. In response to the question of sleep habit change, the majority of those surveyed (305 of 395) (77.2%) indicated that there was a change in their sleep habits during the face-to-face education restriction period. Eighty-five of 300 respondents (28.3%) stated that the amount of sleep decreased, while 73 of them (24.3%) that the amount of sleep increased. The positive response rate was 66.9% (265 of 396) for change in the adolescents' eating habits. While 42.3% of the youth (113 of 267) stated that they ate unhealthier during the restriction period; 19.5% (52 of 267) stated that they ate healthier. Additionally, 262 of 396 teenagers (66.2 %) reported reducing or discontinuing physical activities in comparison to the pre-pandemic era; 181 of 382 (48.6%) reported reducing or stopping leisure activities; and 297 of 355 (83.6%) reported reducing or discontinuing social activities.

In terms of education preference, 67.2% of the participants (266 of 396) answered that they preferred face-to-face education and 32.8% (n = 130) preferred distance.

Young Internet Addiction Test-brief form (IAT) was used to determine the pathological internet use levels of the youths participated in our study. The average score from the IAT was (28.45 ± 11.7). When the IAT mean scores of the participants (n = 438) were evaluated according to varied ranges; the rates were as follows: 12-23 (178, 40.6%), 24-35 (146, 33.3%), 36-47 (77, 17.6%), 48-60 (37, 8.4%).

Secondary aim of our study was to evaluate the psychiatric difficulty areas of adolescents according to their answers for pre-pandemic and post-pandemic and to investigate the relationship between pathological internet use and psychiatric difficulties. Preliminary analyses showed that scores from all SDQ subscales were higher during the school restriction period than before the pandemic, except for the social

Table 1. Descriptive statistics related to psychiatric difficulty areas (n = 356)

	Before pandemic (Mean ± SD)	During restriction (Mean ± SD)	95% confidence interval of the difference		Z value	*p* value
			lower	upper		
Conduct problems	1.82 ± 1.5	2.29 ± 1.6	- 0.59	- 0.35	- 7.489	**< 0.001**
Emotional problems	2.75 ± 2.1	3.69 ± 2.6	- 1.13	- 0.75	-9.202	**< 0.001**
Hyperactivity-inattention	4.28 ± 1.9	4.63 ± 2.0	- 0.50	- 0.18	- 4.191	**< 0.001**
Peer relationship problems	2.55 ± 1.8	2.94 ± 1.9	-0.52	- 0.25	- 5.238	**< 0.001**
Prosocial behavior	8.03 ± 1.9	7.39 ± 2.0	0.49	0.78	8.388	**< 0.001**
Total difficulties score	11.39 ± 4.7	13.55 ± 5.7	- 2.55	- 1.75	- 10.457	**< 0.001**

Table 2. Comparison of psychiatric difficulty areas scores (during pandemic) according to the changes in the sleep, eating habits, the time allocated to daily physical activity, leisure activities and social activities during school restriction

	Decreased PA		Sleep change		Eating change		Leisure activity change		Social activity change	
	- (122)	+ (235)	- (79)	+ (277)	- (119)	+ (238)	- (83)	+ (254)	- (26)	+ (294)
Conduct problems	2.03 ± 1.5	2.44 ± 1.6*	1.83 ± 1.3	2.44 ± 1.6*	2.10 ± 1.8	2.40 ± 1.5	1.85 ± 1.3	2.40 ± 1.6*	2.15 ± 1.6	2.29 ± 1.5
Emotional problems	3.17 ± 2.5	3.97 ± 2.6*	3.02 ± 2.1	3.90 ± 2.7*	3.03 ± 2.3	4.02 ± 2.6*	2.85 ± 2.2	3.97 ± 2.6*	3.34 ± 2.7	3.74 ± 2.6
Hyperactivity-inattention	4.21 ± 1.9	4.85 ± 2.1*	4.15 ± 2.1	4.78 ± 2.0*	4.39 ± 1.9	4.75 ± 2.1	4.00 ± 1.9	4.82 ± 2.0*	4.03 ± 2.0	4.67 ± 2.0
Peer relationship problems	2.69 ± 1.7	3.07 ± 1.9	2.82 ± 1.9	2.98 ± 1.9	2.62 ± 1.8	3.10 ± 1.9*	2.73 ± 2.0	3.01 ± 1.8	2.34 ± 1.3	2.90 ± 1.8
Prosocial behavior	7.65 ± 1.8	7.26 ± 2.1	7.21 ± 1.8	7.43 ± 2.1	7.62 ± 2.0	7.28 ± 2.1	7.67 ± 2.0	7.42 ± 2.0	7.38 ± 2.8	7.56 ± 1.8
Total difficulties score	12.11 ± 4.8	14.30 ± 5.9*	11.83 ± 5.1	14.09 ± 5.7*	12.07 ± 5.5	14.28 ± 5.6*	11.44 ± 5.4	14.18 ± 5.7*	11.88 ± 4.5	13.59 ± 5.7
IAT total score	25.64 ± 10.2	30.75 ± 12.0*	24.98 ± 10.1	30.16 ± 11.8*	25.71 ± 10.8	30.74 ± 11.8*	25.66 ± 10.9	30.28 ± 11.8*	26.07 ± 8.6	29.30 ± 11.9

Note: (-/+) two categories according to whether there was a change in eating, sleep habits, leisure activity and social activity patterns, and whether there was a decrease in physical activity levels.

skills sub-domain, where high scores indicate positive functioning. Descriptive statistics related to psychiatric difficulty areas are seen in table 1. When the scores of psychiatric difficulties and IAT total score were compared according to whether there was a change in eating, sleep habits, leisure activity and social activity patterns, and whether there was a decrease in physical activity levels, the results obtained are shown in Table 2.

Further analyses indicated that there was no significant relationship between IAT scores and age, r (432) = 0.082, and monthly income, r (323) = -0.011. There were positive correlations between IAT and SDQ change- conduct, r (312) = 0.180, $p = 0.001$), SDQ change- emotional, r (312) = 0.243, $p < 0.001$), SDQ change- peer relationship, r (312) = 0.221, $p < 0.001$), and SDQ change-total difficulties, r (311) = 0.290, $p < 0.001$) variables. Significant mild correlations also between the number of changed areas and SDQ change- emotional r (303) = 0.203, $p < 0.001$, SDQ change- hyperactivity r (302) = 0.117, $p = 0.042$), SDQ change- peer relationship r (303) = 0.116, $p = 0.043$ and SDQ change-total subscale r (302) = 0.212, $p < 0.001$ scores (see Table 3).

The variables that might influence IAT total scores were assessed using hierarchical linear regression analysis. Gender and "number of changed areas" variables were entered as the first block when examining predictors of IAT total scores, and the results indicated that the model was significant, and 13.2 % of the variance was explained by the model (F = 18.206, $p < 0.001$). In the model 1; gender did not significantly predict IAT total scores and "number of changed areas" was statistically significant. After entry of the change in the SDQ-conduct, change in the SDQ-emotional and change in the SDQ-peer relationship variables at the second block, the model was still significant (F = 11.611, $p < 0.001$) and total variance explained by the model as a whole was 18.4 % (R squared change = 0.052). In the final model, the number of changed areas (B= 3.071, $p < 0.001$) and the change in the SDQ- Peer relationship subscale score variables were statistically significant (B = 1.193, $p = 0.019$) (4).

The restriction period-SDQ scores of the participants were evaluated after the sample was subdivided on the basis of education preference (n = 357); scores from the "Emotional problems" (t = 2.714, $p = 0.007$,

Table 3. Correlations among the variables: age, monthly income, change in the SDQ subscale scores between before the pandemic and school restriction time, number of changed areas and the IAT total score

	IAT total score		Number of changed areas	
	r	*p* value	r	*p* value
Age	0.082	0.087		
Monthly income	-0.011	0.840		
SDQ Change- Conduct problems	0.157	**0.005**	0.045	0.440
SDQ Change -Emotional problems	0.169	**0.003**	0.174	**0.002**
SDQ Change- Hyperactivity-inattention	0.079	0.167	0.152	**0.008**
SDQ Change- Peer relationship problems	0.113	**0.046**	0.056	0.334
SDQ Change- Prosocial behavior	-0.177	0.107	-0.060	0.300
SDQ Change- Total score	.179	**0.002**	0.179	**0.002**
IAT total score			0.335	**< 0.001**

*Spearman correlation analyses. Note: Number of changed areas: change in the sleep and eating habits, leisure activities, social activities and decrease in physical activities which are actually nominal variables were accepted as dummy variables, treated as a continuous variable, and summed.

95% Confidence Interval (CI): 0.21-1.35), "Peer relationship problems" (t = 4.090, $p < 0.001$, 95% Confidence Interval (CI): 0.44-1.26) and "Total difficulties" (t = 3.304, p = 0.001, 95% Confidence Interval (CI): 0.84-3.31) subscales were statistically significantly higher in the group prefer distance education compared to the group prefer face to face education. And the scores obtained from the "Pro-social behaviors" sub-scale, which indicates positive functionality, were significantly higher (t = -2.471, $p = 0.014$, 95% Confidence Interval (CI): -1.01--.11) in the group prefer face to face education. The IAT total score of the participants who preferred online education was statistically significantly higher than those who preferred face-to-face education (t = 3.81, $p = 0.002$, 95% Confidence Interval (CI): 1.63-6.92).

Table 4. Hierarchical linear regression analysis for variables predicting IAT total score (n = 267)

	Unstandardized Coefficients		Standardized Coefficients Beta	*p* value
	B	Std. Error		
Model 1				
Gender	-0.351	1.321	-0.015	0.791
Number of changed areas	3.532	0.593	0.337	**< 0.001**
Model 2				
Gender	0.222	1.294	0.010	0.864
Number of changed areas	3.071	0.588	0.293	**< 0.001**
SDQ change-conduct	0.969	0.599	0.094	0.107
SDQ change- emotional	0.728	0.396	0.112	0.067
SDQ change- peer relationship	1.193	0.505	0.136	**0.019***

DISCUSSION

In the present study, it was determined that the rate of those who used daily internet/technological devices less than 2 hours a day as recommended by the guidelines was 35.8% for the pre-pandemic period and 23.2% for the restriction period. Moreover, it was detected that the rate of those using the internet for more than 6 hours a day, excluding the time allocated for education, increased during the school restriction period (10.1%-24.4%) compared to the pre-pandemic period. In studies evaluated the effects of social isolation on adolescents due to the pandemic, it was a common finding that adolescents spent more time on the internet during lockdown than before the pandemic [14, 15]. It's noteworthy that the daily internet/technological device usage time in our study has apparently increased during the restrictions. Despite that, the average IAT score was 28.45, that was lower than the value we anticipated. While there is no cut-off value for IAT-brief form to diagnose internet addiction, it was found that approximately 8% of respondents appear to have scores in highest range. Our findings are in line with previous studies. According to the results of two studies from Turkey, which used the same scale "Parent Child Internet Addiction Test" to measure the level of internet addiction during the pandemic period, the rates of those with limited symptoms, although not at the level of internet addiction, were found as 9.7% [16] and 4.8% [17]. The fact that the time, adolescents spend with the internet/technological device is much higher than the recommended duration by the guides may mislead to perceive as addiction. That's because the age-appropriate activities youths used to do offline such as shopping, doing homework, socializing, watching movies or listening to music have recently been done online.

Our study results have revealed that significant changes have also been found in the daily routine of youths who spent a significant part of their time at home during distance education. According to our data, less than 20% of adolescents reported that they slept more than 8 hours a day before pandemic. Although there is no definite opinion about how much children and adolescents should sleep, it has been argued that modern life, technology/internet use may be related to the decrease in the total sleep time of youths in recent years [18]. When the answers given about whether there was a change in their sleeping habits during the period they were educated from home, it has been found that sleep duration decreased in 28.3% of the youths and increased in 24.3% of them. According to the literature, there are several studies in which it has been reported that sleep duration increased [19-21] or decreased [22] in adolescents during the social isolation period [23] have found that overall poor sleep quality was associated with poor oral hygiene during social distancing. Although, sleep habits may vary depending on cultural characteristics or parental attitudes, it has been suggested that adolescents with quality sleep spend less time on the internet/social media [24, 25].

Regarding changes in the other daily habits; 66.2% of the participants that their physical activities, 48.6% of them that their leisure activities; 83.6% of them that their social activities reported that they have reduced or completely quit compared to the pre-pandemic period. A recent systematic review has revealed that daily physical activity levels of adolescents declined, and sedentary life has increased during the period of staying at home due to the pandemic [26]. Positive effects of physical activities on mental health have been known. In a study conducted during COVID-19 pandemic with physiotherapy students, high physical activity levels were found to be associated with lower depressive symptom scores [27]. Relationship between physical activity levels and screen addiction was also examined; A 2015 study found that smart phone overuse might reduce physical activity levels such as walking [28]. In another study investigating the relationship between friendship network and the physical activity levels and indirectly screen time, it was found that being with active friends, especially for boys, had a positive effect on physical activity levels [29]. Due to physical distance and not being able to go to school, adolescent's activity levels have decreased considerably during the restrictions. Physical activity levels have probably not been among the priorities of parents who both had to work at home and were interested in their children's education [30].

There were positive correlations between the number of changes in daily habits such as sleep, eating, physical activity, leisure time/social activities and changes in the psychiatric diffilties particularly in emotional area in the current study. It's well known that mental problems can cause changes in sleep, ap-

petite and activity levels, as well as changes in daily habits can lead to psychiatric symptoms. Ingram *et al* suggested that the changes in diet, sleep quality, and physical activity related to differences in negative mood during COVID-19 lockdown [31]. In a study conducted with university students in China, adverse changes in the living rhythms of students who stayed at home during the pandemic were associated with higher depressive symptom levels; despite, it was determined that favorable living rhythms led to better perceived self-efficacy [32].

Our study results have demonstrated that the adolescents obtained higher scores from all psychiatric difficulty areas during the face-to-face education restriction compared to the pre-pandemic period. In a review evaluating the effects of the COVID-19 pandemic on the mental health of children and adolescents, including studies most of which determined the diagnoses with symptom checklists; Depression and anxiety were most frequent. It was emphasized that the rates of depression were similar to the studies before the pandemic, but it could be said that the anxiety increased compared to the pre-pandemic period [33]. Ozturk *et al*. [34] found that conduct problems and anxious temperament are more frequent in adolescents with internet addiction than in those without in their study investigated the relationship among the internet addiction, affective temperament and psychiatric difficulties in high school students in 2013.

According to our study results, positive significant relationships were also found between the SDQ subscales change scores (between two time points) except for the hyperactivity and the IAT total score, which indicates the level of internet excessive use. In a meta-analysis study, conducted before the pandemic, a positive correlation was found between ADHD and internet addiction and ADHD symptom severity was detected to be higher in those with internet addiction. Thus, it has been suggested that just as ADHD may initiate internet addiction, internet overuse may also negatively affect the prognosis of ADHD [35]. It has been probable that the reason for our findings related to the hyperactivity subscale were not significant might be the relative decrease in school-related responsibilities, the looser rules and the relatively better sustain of attention in front of the screen during the distance education period. The fact that psychiatric difficulty areas were assessed only by adolescents' self-report and the absence of parental reports might be responsible for the outcome.

Regarding regression analyses, "the number of changed areas" was significantly explained 11.5% of the variance and adding the changes in psychiatric difficulty subscale scores significantly increased 5.8 percent of the variance explained ($R2 = 0.173$, $p < 0.001$). The regression coefficients indicated that the number of changed areas ($p < 0.001$, beta = 0.293) have the most effect among the factors that predict pathological internet use levels. This factor was followed by the change in the peer relationship problems subscale scores ($p = 0.019$, beta = 0.136). Our study demonstrated that during the period of school restrictions, adolescents whose daily routines changed and kept away from social life increased significantly various psychiatric difficulties, and especially increase in the problems related to peer relationships significantly predicted their pathological internet use levels. Studies reporting that the idea of loneliness is a predictor of internet addiction [36-38] and on the contrary that social support plays a role in preventing internet abuse [39, 40] emphasizes the importance of strengthening personal relationships and increasing offline social/leisure activities instead of banning the internet [41]. In a recent study, role of peer relationships in the effect of internet addiction on internalizing and externalizing symptoms has been investigated. The authors have suggested that internet addicted youths, who had positive friendships and less delinquent peers, exhibited less aggressive behavior [42]. In addition to strategies to improve peer relationships, emotion regulation techniques (relaxing, meditation, cognitive-behavioral therapies) and integrative treatments including yoga and mindfulness have been demonstrated as effective treatments in the prevention of addiction, including internet addiction [43, 44].

Youths' psychiatric difficulties were compared also according to their educational preferences in our study. Considering that the emotional and peer relationship problems are significantly higher in the group that prefers distance education, it is understandable that the anxiety levels of the adolescents who are away from their peers due to the restriction and lost the opportunity to improve their social skills have increased. Thus, the importance of being with peers, supporting social development and taking psychological protective measures becomes evident. Both, the ability of

adolescents to seek help when they feel that they have lost their control over the internet, or being identified of pathological usage would be easier with face-to-face education.

Limitations

Our study has a number of restrictions. First, in the duration when the study data were collected, face-to-face education had just started after a long time. Because social isolation was ended mainly, and social activities started except school in this period, the findings need to be interpreted with attention. Secondly, since the questionnaire was not administered in person to the adolescents, it should be taken into account that its reliability was low. Gathering information about a time point in the past, is also a limitation as there is a risk of forgetting. Final limitation is that the socioeconomic levels of the participants are not homogeneous. However, no correlation was found between the primary outcome of our research: the levels of internet overuse, and the monthly income of the families.

CONCLUSION

Despite these, the use of standardized self-report scales to determine psychiatric difficulty areas and pathological internet use levels and the fact that the design of the study is based on the comparison of evaluations made for two separate time points provides an advantage over the other studies. It has been well known that psychiatric difficulties experienced in adolescence negatively affect school success, social functionality and family relationships, and therefore reduce the quality of life in adulthood. So, understanding negative effects of social distancing on mental health and internet addiction and determining the risk or resilience factors would be beneficial for similar situations that may be encountered in the future [45].

Authors' Contribution

Study Conception: DA; Study Design: DA, FG; Supervision: DA, FG; Funding: N/A; Materials: N/A; Data Collection and/or Processing: DA; Statistical Analysis and/or Data Interpretation: DA, FG; Literature Review: DA; Manuscript Preparation: DA, FG and Critical Review: FG.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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