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Parental Attachment and the Theory of Mind Abilities as Predictors of Internet Addiction in Turkish Adolescents

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Abstract

Background: This study aims to investigate the effects of maternal attachment (MA) and paternal attachment (PA) levels and abilities of reading the mind in the eyes on internet addiction (IA) from a group of Turkish adolescents.

Methods: This study was conducted among 900 adolescents between the ages of 14-16. Short Form of Young's Internet Addiction Test (YIAT-SF), Child Form of Reading the Mind in the Eyes Test (Eyes Test), Short Form of Inventory of Parent and Peer Attachment (s-IPPA); and The Strengths and Difficulties Questionnaire (SDQ) self-report form were used. The independent-sample t-test, chi-square test, Pearson moment product correlation test, and The Binary logistic regression analysis were all used for statistical analysis.

Results: 12.7% (n = 111) of the adolescents were in the IA group. YIAT-SF scores were negatively correlated with the Eyes Test and s-IPPA scores. There was a positive correlation between YIAT-SF scores and SDQ problem scores. The Binary regression analysis indicated that the Eyes Test, MA, and PA scores predict being in the IA group. SDQ inattention/hyperactivity, conduct, peer relation, and emotional problem scores and total problem scores were higher in the group with IA compared to the group without IA.

Conclusions: Low abilities in reading the mind in the eyes, insecure MA and PA styles are associated with the increased risk of IA in adolescents. Adolescents with IA have higher levels of inattention/hyperactivity, conduct, peer relation, and emotional problems compared to their peers.

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INTRODUCTION

The internet has become an indispensable part of our lives. Today, more than half of the world's population has internet connection [1]. The internet provides an opportunity to access information, create social interactions, help with our daily routine in a more user-friendly and rapid way [2,3]. However, the excessive use of the internet has developed an internet addiction (IA), which has become an increasing problem in people's lives that they simply cannot live without it. [2] IA may cause negative effects on the psychosocial status of individuals [2,4-7] causing comorbid psycho-emotional issues such as; loneliness, a social phobia, major depression, anxiety disorders, personality disorders, substance use disorders [8-11]. The prevalence of IA was found to be between 6% and 11% in the USA [12]; 15.8% and 19% in Taiwan [13], 11.7% in Switzerland [14], and about 16% – 24% in Turkey [15,16].

Within the attachment theory framework, it is suggested that insecure attachment makes individuals vulnerable to develop IA [17-20]. The attachment refers to an emotional bond between the primary caregiver and infant. If the caregivers provide the appropriate socio-emotional and physical needs of the child, the attachment may securely develop. [21,22]. Individuals with an insecure attachment style have lower levels of self-esteem, emotional regulation problems, ineffective and incompatible coping skills [23]. Insecure attachment increases the risk of emotional issues such as; depressive symptoms, high anxiety levels, all emotional problems, which are associated with decreased self-esteem levels and interpersonal and social problems [24]. Individuals with insecure attachment styles tend to prefer online environments aimed at increasing their social interactions by avoiding more threatening direct

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communications because of their feelings of high levels of anticipated social rejection and isolation [18]. Taking all these theoretical knowledge and research results into consideration that attachment disorganization may be one of the key factors for understanding IA.

Another factor that may be related to IA is the ability to read the mind in the eyes (RME) [25]. The ability of the RME is a part of the Theory of mind (ToM), which is defined as the ability that helps the individuals to understand and predict the cognitions, related emotions, and intentions of other people [26,27]. The ability of RME allows individuals to recognize facial expressions of other people [28], and it is suggested that it is negatively associated with the development of IA [29,30]. Individuals with low ability of RME are more likely to experience problems within interpersonal interactions as they may not correctly comprehend the social signals and codes. It was reported that individuals with a low RME tend to be less anxious with online interactions as opposed to being within the face to face communications and thus are more likely to prefer online social interactions compared to their peers [31].

Previous studies suggested that insecure attachment [20] and low RME abilities [30] are associated with the development of IA. Although there are studies in the literature that investigate the relationship between attachment and internet addiction and the relationship between ToM and internet addiction, to the best of our knowledge, there are currently no studies undertaken that have investigated these topics as a whole in the same study. From this point of view, in this study, we will examine whether parental attachment and ToM skills can significantly predict internet addiction. In addition, relationships between internet addiction and emotional problems, behavioral problems, ADHD, and peer relationships will be examined. We hypothesized that the results of this study would indicate negative correlations between attachment and RME ability levels, and the IA scores, and insecure MA and PA, and a low RME ability should predict IA status. The other hypothesis of this study is that emotional problems, conduct problems, inattention/hyperactivity, and peer relationship problems would be higher in adolescence with IA compared to their peers.

METHODS

Participants

The study was conducted on 900 secondary school students who were obtained from three different districts of the European side of Istanbul. To reduce the effect of socio-economic bias, three districts were selected according to the difference of their socio-economic status. The districts representing low, medium and high the quality of life, where our study was conducted determined randomly by taking the reference of the study in which Seker M, Bakis C, Dizeci [32] classified 39 districts of Istanbul according to the quality of life and which schools would be attended in the selected districts were determined as random. The sample was obtained using the random sampling method. Initially, the researchers made contact with psychological counselors of the schools. According to the information taken, adolescents diagnosed with an autistic spectrum disorder, an intellectual disability, learning disorder, visual or hearing impairments were not included in the study. Thirteen participants wanted to withdraw, and the scales of 14 participants were not completed appropriately. The remaining 873 participants were included in the statistical analysis. 56.9% of the participants consisted of female students (n = 497; $\bar{x}$age = 14.85) and 43.1% male students (n = 376; $\bar{x}$age = 14.72). The research data was collected in February and March 2018. The required permissions were obtained from the ethics committee (Ondokuz Mayis University, decision date/number: 2017/244) and Istanbul Provincial Directorate of National Education. The scales were fulfilled in the supervision of a researcher, and no time limits were specified for participants when filling out the measurement materials. All of the participants and their parents were informed about the aim and procedure of the research, and their written consent was obtained.

INSTRUMENTS

Socio-demographic form: The variables age, gender, school status, etc. were questioned with the socio-demographic data form. The information about the purpose of being online on the internet and devices used to access the internet was also asked in the same form.

Short Form of Young's Internet Addiction Test (YIAT-SF): The original scale was developed by [33] Young. The scale consists of 20 items and has a 6-point Likert-type rating. Pawlikowski, Altstotter-Gleich C, Brand [34] developed a short form (YIAT-SF) of a 12-item scale with a 5-point Likert-type rating. The Turkish validity and reliability study of YIAT-SF was carried out by Kutlu, Savci, Demir, and Aysan [35]. The Cronbach alpha value of the Turkish YIAT-SF was found as 0.86 in adolescents. The scale scores range from 12 to 60.

Child Form of Reading the Mind in the Eyes Test (Eyes Test): Eyes Test, which is used to measure the abilities of RME, was first performed by Baron-Cohen, Jolliffe, Mortimore, and Robertson [36]. The original version of the scale consists of 25 items. Baron-Cohen, Wheelwright, Hill, Raste, and Plumb revised the scale; developed a 36-item adult form and a 28-item child form [37]. The revised Eyes Test has 4 black-and-white images for each item. Participants are asked to select the correct picture that reflects the specified emotion. The other three pictures are deliberately misleading. The reliability and validity of the Turkish Eyes Test were performed on children aged from 6 to 16, and the Cronbach alpha value was found as 0.72 [27]. The scale scores range from 0 to 28.

Short Form of Inventory of Parent and Peer Attachment (s-IPPA): The original version of the scale was developed

by Armsden and Greenberg [38] and consisted of 28 items. S-IPPA is a 7 Likert type scale and consists of 12 items. S-IPPA was developed by Raja, Mcgee, and Stanton [39], and the Turkish validity and reliability study was performed by Gunaydin, Selcuk, Sumer, and Uysal [40]. Turkish s-IPPA has two subscales: maternal attachment (MA) and paternal attachment (PA) parts. The Cronbach alpha values of the Turkish s-IPPA were found to be 0.88 for the MA and 0.90 for the PA parts. The subscale scores of MA and PA parts both range from 12 to 84. Higher scores indicate a higher quality of attachment.

The Strengths and Difficulties Questionnaire (SDQ) Self Report Form: SDQ was developed by Goodman [41]. It is a 3-point Likert-type rated scale and consists of 5 subscales. The four subscales analyze emotional problems, conduct problems, inattention/hyperactivity, and peer relationship problems. The sum of the four subscale scores indicates the total problem score. The pro-social behaviors subscale scores point out positive social behaviors. The validity and reliability study of the Turkish SDQ was carried out by Guvenir et al. [42]. SDQ has a parent form and a self-report form. In our research, the self-report form was used. The self-report SDQ can be used in adolescents whose ages are between 11 and 17. The Cronbach alpha value of Turkish SDQ was found to be 0.73 [42].

Statistical Analysis

The data was analyzed by the IBM SPSS 24 statistical program. Kolmogorov Smirnov's test revealed that the data were normally distributed. Considering the research of Pawlikowski et al. [34], the participants with total scores of 36 and above at "YIAT-SF" were regarded as "the group with internet addiction (the IA group)" and those with scores below 36 were considered to be "the group with a non – internet addiction (the NIA group)." A power analysis was performed, which revealed that the minimum required number of participants was 15 for each group. Also, in the sample size calculation performed with the help of the G-power program, it was determined that to test the initial validity hypothesis with 0.95 power, at least 35 subjects should be included in each sample [43-45]. Categorical variables were compared using the chi-square test. The independent-sample t-test analysis was performed to compare the scale scores of the IA and NIA groups. Pearson's moment product correlation test was used to perform the correlation analysis between the scale scores. The predictive effects of the MA, PA, and Eyes Test scores on the status of being in the IA group were examined by binary logistic regression analysis.

RESULTS

In the present study, The Cronbach alpha values of YIAT-SF, Eyes Test, MA, and PA scales were found to be as 0.842, 0.504, 0.827, 0.865, respectively. 80.5% of the adolescents reported that they have their computer and/or tablet, 94.2% reported that they have a smartphone. 75.1% of adolescents primarily prefer to use their smartphones to access the internet. When online, social media was the main activity used by the participants (34%). Followed by online gaming (11.2%), online video watching (7.7%), education /information (5.5%), listening to music (4.7%), and 34.2% of the participants were using the internet for several other purposes. According to the YIAT-SF scores, 12.7% (n = 111) of the adolescents were in the IA group. Two-way chi-square analysis indicated that IA status of the participants differs significantly according to the main purpose of being online ($p<0.05$) (Table 1).

Table 1. The relationship between the participants' internet addiction status and internet usage information

		IA		X^2	Sd	p
		NIA	IA			
Main Purpose	Education/ research	48 (5.5%)	0 (0%)	13.064	6	0.042
	Social media	259 (29.7%)	38 (4.4%)			
	Gaming	78 (8.9%)	20 (2.3%)			
	Video watching	59 (6.8%)	8 (0.9%)			
	Listening to music	37 (4.2%)	4 (0.5%)			
	Multiple	262 (30%)	37 (4.2%)			
	Other	19 (2.2%)	4 (0.5%)			
Total		762 (87.3%)	111 (12.7%)			

Chi-square analysis, NIA: Non-Internet Addiction, IA: Internet Addiction, Sd: Standart deviation

Inattention/hyperactivity, emotional symptoms, conduct problems, peer relationship problem scores, and total problem scores were higher, and pro-social behavior scores were lower in the IA group compared to the NIA group ($p<.0.001$) (Table 2). There was a negative correlation between YIAT-SF and Eyes Test ($r = -.106$, $p<0.001$), MA ($r=-.398$, $p<0.001$), and PA ($r=-.313$, $p<0.001$) scores and a positive correlation between YIAT-SF and SDQ total scores ($r=.430$, $p<0.001$) inattention hyperactivity ($r=.331$), emotional ($r=.289$), conduct ($r=.374$) and peer relation problem ($r=.189$) scores ($p<0.001$). The correlation coefficients of the scale score comparisons are presented in Table 3.

The binary logistic regression analysis model, which was conducted to investigate the predictive effects of MA and PA levels and Eyes Test scores on IA, was statistically significant ($x^2_{(3)} = 67.769$, $p <0.001$; Nagelkerke $R^2= .140$). The results of the logistic regression analysis revealed that one unit increase in MA ($p<0.001$) and PA ($p<0.05$) levels respectively reduces the likelihood of being in the "IA" category by 1.04 and 1.02 times. Additionally, one unit increase in the Eyes Test score reduces the likelihood of being in the "IA" category by 1.09 times ($p<0.05$). The results of the logistic regression analysis are presented in Table 4.

Table 2. SDQ total and subscale scores of the adolescents with IA and NIA

Scores	Groups	$\bar{x}$	Sd	*t* Test		
				t	Sd	P
SDQ	NIA	11.553	5.035	-10.138	871	<0.001
Total	IA	16.748	5.107			
SDQ	NIA	4.022	1.972	-5.890	871	<0.001
Inattention/hyperactivity	IA	5.196	1.894			
SDQ	NIA	2.804	2.211	-7.426	871	<0.001
Emotional Problems	IA	4.502	2.514			
SDQ	NIA	2.246	1.586	-9.465	871	<0.001
Conduct Problems	IA	3.790	1.734			
SDQ	NIA	2.481	1.694	-4.463	871	<0.001
Peer Relationships	IA	3.260	1.877			
SDQ	NIA	8.100	1.923	5.772	871	<0.001
Social Behaviours	IA	6.701	2.444			

Independent Samples t Test, SDQ: The Strengths and Difficulties Questionnaire, IA: Internet Addiction, NIA: Non-Internet Addiction. IA ≥59 ; NIA <59 according to TAS-20, Sd: standart deviation

Table 3. The correlation coefficients between the Eyes Test, MA, PA , YIAT_SF and SDQ total and subscale scores

	1	2	3	4	5	6	7	8	9
1. YIAT-SF Total[1]	-								
2. RMET-C Total[2]	-.106* p=0.002	-							
3. MA Total[3]	-.398* p=<0.001	.082** p=0.015	-						
4. PA Total[4]	-.313* p=<0.001	.049 p=0.144	.608* p=<0.001	-					
5. SDQ Inattention/ hyperactivity	.331* p=<0.001	-.083** p=0.015	-.283* p=<0.001	-.292* p=<0.001	-				
6. SDQ Emotion	.289* p=<0.001	.029 p=0.394	-.341* p=<0.001	-.375* p=<0.001	.313* p=<0.001	-			
7. SDQ Conduct Problems	.374* p=<0.001	-.156* p=<0.001	-.383* p=<0.001	-.325* p=<0.001	.322* p=<0.001	.295* p=<0.001	-		
8. SDQ Peer Problems	.189* p=<0.001	-.175* p=<0.001	-.287* p=<0.001	-.306* p=<0.001	.159* p=<0.001	.350* p=<0.001	.320* p=<0.001	-	
9. SDQ Social Behaviours	-.313* p=<0.001	.113* p=0.001	.319* p=<0.001	.265* p=<0.001	-.186* p=<0.001	-.125* p=<0.001	-.470* p=<0.001	-.276* p=<0.001	-
10. SDQ Total[5]	.430* p=<0.001	-.125* p=<0.001	-.469* p=<0.001	-.476* p=<0.001	.665* p=<0.001	.760* p=<0.001	.669* p=<0.001	.639* p=<0.001	-.363* p=<0.001

Pearson moment product correlation analysis, *p<0.001 **p<0.05. YIAT-SF: Short Form of Young's Internet Addiction Test, MA: Maternal Attachment, PA: Paternal Attachment, SDQ: The Strengths and Difficulties Questionnaire.

Table 4. The predictive effect of MA and PA levels and the scores of the Eyes Test on IA status

							95% confidence interval for Exp (B)	
	B	Sh	Wald	Sd	p	Exp(B)	Low	High
MA[1]	-.043	.009	21.293	1	<0.001	.958	.941	.976
PA[2]	-.022	.008	7.382	1	0.007	.979	.963	.994
Eyes Test[3]	-.082	.033	6.330	1	0.012	.921	.864	.982
Constant	3.590	.800	20.371	1	<0.001	36.242		
Nagelkerke R^2= .140; Omnibus $X^2_{(3)}$= 67,769 (p<.001); Hosmer & Lemeshow= $X^2_{(8)}$= 14.427, p>.05. IA (n=762; 87.3%); NIA (n=111; 12.7%).								

Binary Logistic Regression Analysis, MA: Maternal attachment, [2]PA: Paternal attachment, IA: Internet Addiction.

DISCUSSION

The results of this study indicated that the low MA and PA levels and low RME ability are associated with IA development in adolescents. In this study, the sample group consisted of adolescents aged between 14 and 16, and the prevalence of IA was 12.7%. The prevalence of IA was reported as 24.2% [16] in Turkish adolescents. Uneri and Tanidir [16] conducted their study on 211 high school students in Ankara and used the Internet Addiction Scale developed by Gunuc [46], The difference between the results of Uneri and Tanidir's study [16] and the present study can be explained by the different measuring instruments and socio-demographic characteristics of the sample. The results of this study also suggested that the prevalence of IA did not differ between male and female participants. Several studies reported the prevalence of IA is higher in males than females [1,3,20]. However, in the supporting results of this study, there are also studies that report the prevalence of IA being similar in both males and females [47,48]. Young females tend to participate in social networks [49], and the increase of the popularity of social media in adolescents [50] may explain our results, which suggests that the rate of IA is similar in female and male participants.

In concordance with the first hypothesis of this study, the correlation analysis suggested that MA and PA levels are negatively correlated with IA scores, and the logistic regression analysis revealed that MA and PA levels predicted being in the IA group. Consistent with the results of this study, numerous studies are showing that insecure attachment characteristics are associated with IA [17,20,51-58]. Adolescents who have insecure attachment patterns may perceive their parents' interventions on their internet usage as an intervention on their autonomy. The s-IPPA scale consists of items that evaluate adolescents' view on trust, communication, and alienation levels in the relationship with their parents [39]. Considering the results of this study, it may be suggested that adolescents who perceive their parents as untrustworthy and their communication with them as irritating, may refuse the limitation efforts of the parents regarding their internet usage. Another research study by Sela et al. [59] suggests that high family conflicts are associated with problematic internet usage among adolescents, also supporting the related results of this study.

It was reported that an insecure attachment style increases the risk of low levels of self-esteem and social skills, inhibiting the development of healthy regulation of emotion [23]. Thus, individuals with a low attachment quality tend to feel uncomfortable and insecure in establishing new personal relationships and participating in social interactions [18]. Adolescents with insecure attachment styles may limit their face to face social interactions to avoid the risk of rejection and exclusion, whereby high levels of anxiety can prevail. Thus, they tend to develop personal relationships and social interactions via the internet [60]. It is also well-known that an insecure attachment style is associated with the development of depression symptoms [23,61]. Taking our results into consideration it can be suggested that adolescents with a low attachment quality may participate in enjoyable online activities such as; online gaming and social media, which may help them decrease their potential depression symptoms, additionally, they may prefer to acquire new social contacts via the internet despite their probable high levels of social anxiety. Therefore, online environments may help individuals establish new friendships and participate in new social activities while protecting adolescents from high social anxiety levels and the feeling of unworthiness and rejection. The associations between an insecure attachment style and problems with increased emotional levels may be better explained using the results of this study, by comparing the relationship between low attachment quality and the development of IA in adolescent age groups. The results of this study are in concordance with the results of Nakhoul et al. [62] suggesting insecure attachment is associated with IA in Lebanese adolescents.

The results of the correlation and logistic regression analysis of this study revealed that there is a significant association between RME abilities and the development of IA in adolescents. These results support the study of Korkmaz et al. [25] that reported the low RME abilities in university students with problematic internet use. The abilities of RME have a significant role in regulating behaviors and increasing adaptive attitudes in social interactions [63]. Adolescents with the low ability of RME may experience problems in comprehending the emotions of his/her peers and family members. Such problems in emotional comprehension may increase inappropriate social behaviors, which may lead the adolescent to be socially excluded with socio-emotional problems. Consistent with this data, Caplan [31] suggested that adolescents with low social skills tend to prefer online social interactions with an aim to ease their social anxiety. It can be suggested that considering the results of the present study, preferring online social interactions may increase the risk of IA development in adolescents with low RME. Similar to the results of this study, Savolainen, Oksanen, Kaakinen, Sirola, and Paek [8] suggested that loneliness is associated with compulsive internet use. Yao and Zhong [64] reported that there is a vicious circle between social problems, loneliness, and IA. The aggressive attitude and impulse control problems [65] of the individuals with low RME emerging from the misinterpretation of the emotions of other people, being another factor for explaining the results of this study.

In concordance with the second hypothesis of this study, it was found that the SDQ total and subscale problem scores were higher in adolescents with IA compared to the NIA group. Pontes, Kuss, and Griffiths reported that impulse control problems might cause problems in limiting the time of internet use [66]. Supporting the result of Pontes et al., the results of an independent sample t-test revealed that conduct problems, peer relation problems, and inattention/hyperactivity scores of the adolescents with IA were higher compared to the NIA group. Yao et al. [64] suggested that

emotional problems are associated with IA development. In accordance with this data, the results of this study indicated that the psychological problem scores of the IA group were higher in comparison to the NIA group. These results suggest that comorbid emotional and behavioral problems may not be overlooked in therapeutic interventions regarding IA problems in the adolescent age group.

The results of this study should be considered with some limitations. The cross-sectional nature of the study limits any clear evaluation of causality. The sample of this study consists of adolescents aged from 14 to 16, and further research by investigating this topic using an example of different age groups may improve our knowledge. As far as our research into this topic goes, this study is the first research paper in this area, which focuses on all of the variables mentioned as a whole. Considering the provided data, the authors suggest that the results of this research study should make a significant contribution to the literature that is lacking in this field.

CONCLUSION

The results of this study revealed that low RME abilities and insecure attachment patterns are associated with IA development in adolescents. Additionally, inattention/hyperactivity, conduct problems, peer relationship problems are higher in adolescents with IA compared to their peers. These results indicate that therapeutic interventions focusing on attachment quality, RME abilities, and related comorbid conditions may decrease IA levels in adolescents. The authors suggest that further longitudinal studies are needed to improve our knowledge in relation to the causal relationships between IA, attachment quality, RME, and psychological problems and how to improve the success of therapeutic interventions.

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