

ORIGINAL RESEARCH

The Effects of Cyber Bullying or Victimization Behaviors on Social Reciprocity and Online Cognition of Adolescents with Attention-Deficit/Hyperactivity Disorder

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Abstract

Objective: Cyberbullying or its victimization reported previously at a higher rate within adolescents with attention-deficit/hyperactivity disorder (ADHD) might have related with their social reciprocity or online cognition deficits.

Methods: In this study, problematic internet use and social reciprocity was evaluated with social reciprocity scale (SRS) and online cognition scale (OCS) in 124 adolescents (65 ADHD and 59 healthy counterparts).

Results: Of 37.1% were cyberbullies (which 60.9% of them had ADHD) and 61.3% had cyberbully-victims (which 56.6% of them had ADHD). All SRS subscale scores as well as all OCS subscale scores (except distraction) were found to be higher in adolescent with ADHD compared to the control. In ADHD group, all subscales of the SRS (except stereotypes and autism) were higher in not-cyber victims.

Conclusion: ADHD is a risk factor on the basis of inappropriate social reciprocity in cyberbullying. Adolescents with ADHD display problematic online cognition and social reciprocity even they are not cyberbullies or cyber-victims. Social interventions addressing to solve this issue might be helpful for not-being cyberbully or cyber-victim in adolescents with ADHD. Further studies are to be needed.

Keywords: Attention deficit, Hyperactivity, Online cognition, Social reciprocity, Children

INTRODUCTION

Possibilities provided by technology and widespread use of it have led to the concept of 'cyberbullying' that is defined as the type of bullying by way of electronic-medium, instant messaging, on a web page, or by sending messages or digital images via mobile phones (1,2). Studies have shown that adolescents with bullying behavior are more likely to experience psychiatric problems including depression, anxiety, suicide, and school adjustment problems, alcohol and substance use (3,4,5,6). For these reasons, cyberbullying is a serious health problem among bullying adolescents that needs

further investigation by mental health and education specialists. At the same time, being exposed to the cyberbullying is another current and important issue. Being exposed to the cyberbullying leads to major problems such as lower self-esteem, poor academic performance, depression, stress, violence and suicide in young people (7). Children who have been exposed to the cyberbullying have reported that they feel more feelings such as sadness, anxiety, fear, and that their academic achievements fall due to the attention problems (8).

Attention-deficit/hyperactivity disorder (ADHD) is a common disorder in childhood period. Children and adolescents with ADHD are usually impulsive, aggressive, demanding and stubborn when they are with their friends (9). These behaviors lead to their frequent outbreaks by others, or their bullying behavior, as well as their exclusion by their peers (10). In cross-sectional and prospective studies, adolescents with ADHD were found to be a high-risk group in terms of traditional bullying and victimization (11,12). In addition, traditional

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bullying is often accompanied by cyber bullying (13). For these reasons, there is a risk of displaying a cyberbullier pattern in adolescents with ADHD. In a study, conducted with 11-18 aged 251 male adolescents with ADHD, cyberbullying was found to be associated with combined subtype of ADHD (14). Another study investigated the relationship between cyberbullying and loneliness, self-efficacy and social support in 140 students with ADHD compared to the healthy 242 subjects, all 12-16 aged, revealing that those with ADHD were more cyber-victims, more cyberbullier and more witness to the cyberbullying (15). Another study, conducted by 82 university students (mean age 19.9 years) with ADHD or other disabilities, reported that these students are at significant risk for victims of cyberbullying compared to 123 healthy students (16).

This study aimed to investigate should cyberbullying is more prevalent in children and adolescents with ADHD, and their on-line cognition and social reciprocity are more likely to be affected due to ADHD compared to the healthy counterparts.

METHODS

Of 65 children aged 11-18 years, admitted and diagnosed with ADHD according to the DSM-5 criteria (APA, 2013) (17) by Ankara University Faculty of Medicine, Child and Adolescent Psychiatry polyclinics, and their parents were included in this study after being informed about the study. As a control group, 59 healthy children aged 11-18 years matched with ADHD group in terms of age and gender attending secondary schools and high schools in Ankara province were included in this study. Verbal information was given to the participating child and his or her parents about the purpose and scope of the research, and then a written approval form was signed and a copy was given to them.

In order to compare psychometric parameters in children with and without ADHD, cyberbullying and victims scale scores were used as primary outcome variables. The scores obtained were grouped into four groups based on "discriminant analysis" as more than 24 points obtained from the cyberbullying scale was defined as those "cyberbullies", and 24 points obtained from the cyber-victimization scale were defined as "cyber-victims". The subjects whose cyberbullying and cyber-victims scale scores had up to 24 points were defined as those who were "not the cyberbully-victims".

Criteria for inclusion to the study were the following; 11-18 years of age, having ADHD for ADHD group and

having no ADHD, no intellectual disability, no autism spectrum disorder, no chronic physical disease for control group whom they voluntarily participated to this study. Exclusion criteria were not aged with 11-18 years, having intellectual disability or autism spectrum disorder or chronic physical illness and not volunteering to participate in the study.

The G*Power 3.1.8 package program (Universitat Kiel, Germany 1992) was used to calculate the sample size (18). In each group, at least 51 subjects was considered to be acceptable with a minimum of 80% power and 0.05 error according to the two-sided test. The research has been evaluated and approved by the clinical research ethics committee of the Ankara University Faculty of Medicine (decision date: 09.03.2015 and decision number: 04-181-15).

Tools

Sociodemographics form: Demographics variables were defined via this form prepared by the researchers and fulfilled by both parents and adolescents.

Schedule for Affective Disorders and Schizophrenia for School-age Children – Present and Lifetime version (K-SADS): It is a semi-structured interview form based on DSM-IV, prepared by Kaufman (19) used to detect present and lifetime psychopathologies in children and adolescents. With K-SADS, mood disorders, psychotic disorders, anxiety disorders, outburst disorders, destructive behavior disorders, substance abuse, eating disorders and tic disorders can be evaluated. Validity and reliability studies were conducted for the Turkish sample of the scale (20).

Cyber Bullying Scale (CBS): The scale, developed by Aricak et al (21) and shown to be a valid and reliable measurement tool for adolescents aged 11-18 years, consists of 24 items and is answered on 4-Likert type (Never, sometimes, most of the time, always) on the scale. "never" is rated as one point, and "always" is scored as four points. Thus, the lowest score that can be taken from the scale is 24 and the highest score is 96. The Cronbach alpha coefficient calculated for the whole scale was .95; test-retest reliability study was found to be .70 (n = 103).

Cyber Victimization Scale (CVS): The scale, developed by Aricak et al (22) and valid for 11-18 aged of children, consists of 24 items and is answered on a dicotomic scale as "No" or "Yes". "No" is evaluated as one point, and "Yes" is scored as two points. Thus, the lowest score that can be taken from the scale is 24 and the

highest score is 48. The increase in the scores indicates the high level of being a victim of cyberbullying. The Cronbach's alpha coefficient for the whole scale was .89 and the test-retest reliability coefficient was .75 (n = 96).

Online Cognition Scale (OCS): This 36-items, seven-point Likert's type scale (from "absolutely disagree" to "absolutely agree") evaluates thoughts, attitudes and beliefs about the Internet. It is scored from 1 to 7 and higher scores is considered as "problematic use". It was developed by Davis et al. (23) and validated to the Turkish by Ozcan and Buzlu (24). It examines four headings as 1) loneliness/depression 2) diminished impulse control, 3) social comfort, and 4) distraction.

Social Reciprocity Scale (SRS): Developed by Constantino et al (25) to assess the autism-like symptom cluster. There are a total of 65 items related to social behavior that can be observed on the scale, 39 items on language use and 6 items on autistic behaviors. Higher scores mean more severe social deterioration. Of 60 scores and above of social reciprocity scale indicates clinical problematic issues in this field (26).

Procedure: After informing about the study and obtaining written consent, K-SADS interview was applied by the clinician to the children and parents. The CBS, CVS, OCS scales were filled by the adolescents and the SRS scales were filled by parents. Sociodemographic variables form was filled by responders during the interview with clinician.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS 22.0) was used to analyse. Kolmogorov Smirnov test was used to determine normality. Student-t test and Mann Whitney-U test were used to compare continuous variables between ADHD and control group. Pearson Chi-square and Fisher's exact test were used to analyze categorical variables. Spearman correlation analysis was used to determine whether there is a association between OCS and SRS scores. $P < .05$ was accepted as significant for two-tailed analyses.

RESULTS

Demographics

Of 124 cases, 37.1% (n=46) were cyberbullies, 51.5% (n=64) were cyber-victims. Of 38.7% (n=48) were out of cyberbully-victims whereas 61.3% (n=76) were in cyberbully-victim cycle. While gender proportion was

the similar within three groups ($p > .05$), median age of adolescents where in cyberbully-victims (n=76) were found to be significantly higher (15 vs. 14; $z = -2.215$, $p = .027$).

Median age of mothers were significantly higher whose children were cyberbullies (n=46) (43.5 vs. 39; $z = -3.289$, $p = .001$) or were in cyber-victim group (n=76) (42 vs. 39; $z = -2.663$, $p = .008$).

School performance was found significantly lower in cyberbullies group (60.9% vs. 38.5%; $\chi^2 (1) = 5.836$, $p = .016$) as well as adolescents where in the cyber bully-victim cycle (57.9% vs. 29.2%; $\chi^2 (1) = 9.753$, $p = .002$).

The presence the internet in homes was significantly higher in cyberbully-victims (81.6% vs. 64.6%; $\chi^2 (1) = 4.532$, $p = .033$) and in the cyber-victims (82.8% vs. 66.7%; $\chi^2 (1) = 4.306$, $p = .038$) whereas smartphone was at a higher rate in the cyberbullies (87% vs. 64.1; $\chi^2 (1) = 7.594$, $p = .006$).

Median duration of smartphone use on a daily basis was higher in the cyber-victim group (3 vs. 1; $z = -3.111$, $p = .002$) whereas hours spent by the adolescents to use PC was higher in the cyberbullies (2 vs. 1; $z = -2.442$, $p = .015$).

Median levels of smartphone daily use (in hours, reported by adolescents' parents) of the adolescents was found significantly higher in whom they were in the cyber bully/victim cycle compared that of not – in the cyber bully/victim cycle (3 vs. 1; $z = -3.602$, $p < .001$), and in whom they were the cyber-victims compared to the not-cyber victims (3 vs. 1; $z = -2.667$, $p = .008$), and in whom they had cyber-bullier behavior than that of not-cyber bullies (3 vs. 2; $z = -3.096$, $p = .002$) (see Table 1).

Psychiatric Diagnoses

Diagnosed with ADHD based on DSM-5 compared to not-having ADHD was not different among the cyber bully/victim group, cyber-victim group and cyberbullies group (for all $p > .05$, see Table 1). Having a K-SADS diagnosis was found to be significantly higher in the cyberbullies adolescents than that of not-cyber bullies (43.5% vs. 21.8%; $\chi^2 (1) = 6.498$, $p = .011$). In ADHD group, the proportion of the K-SADS diagnosis was significantly higher in the cyberbullies (60.7% vs. 39.3%; $\chi^2 (1) = 4.196$, $p = .041$, see Table 1).

Table 1. Comparisons of the demographics of 124 adolescents regarding their cyber-experiences

	Cyberbullies	Not-CB	Statistics		Cyber-victims	Not-CV	Statistics		CB-CV	Not CB-CV	Statistics	
	n = 46	n = 78	z or χ^2	p	n = 64	n = 60	z or χ^2	p	n=76	n=48	z or χ^2	p
Age (years) ^a	15 (11-18)	14 (11-18)	-1.820	.069	15 (11-17)	14 (11-18)	-1.967	.049	15 (11-18)	14 (11-18)	-2.215	.027
Mother's age (yr) ^a	43.5 (33-52)	39 (29-51)	-3.289	.001	42 (29-52)	40 (32-51)	-1.925	.054	42 (29-52)	39 (32-50)	-2.663	.008
Gender, n (%)			.030	.863			.443	.506			.137	.712
Female	10 (21.7)	18 (23.1)			16 (25.0)	12 (20.0)			18 (23.7)	10 (20.8)		
Male	36 (78.3)	60 (76.9)			48 (75.0)	48 (80.0)			58 (76.3)	38 (79.2)		
Academic, n (%)			5.836	.016			1.218	.270			9.753	.002
Over-achievement	18 (39.1)	48 (61.5)			31 (48.4)	35 (58.3)			32 (42.1)	34 (70.8)		
Under-achievement	28 (60.9)	30 (38.5)			33 (51.6)	25 (41.7)			44 (57.9)	14 (29.2)		
NET in home, n (%)			3.732	.053			4.306	.038			4.532	.033
Yes	39 (84.8)	54 (69.2)			53 (82.8)	40 (66.7)			62 (81.6)	31 (64.6)		
No	7 (15.2)	24 (30.8)			11 (17.2)	20 (33.3)			14 (18.4)	17 (35.4)		
SP owner, n (%)			7.594	.006			.389	.533			2.517	.113
Yes	40 (87.0)	50 (64.1)			48 (75.0)	42 (70.0)			59 (77.6)	31 (64.6)		
No	6 (13.0)	28 (35.9)			16 (25.0)	18 (30.0)			17 (22.4)	17 (35.4)		
SP owner (years) ^a	2.5 (0.2-7)	2 (0.3-6)	-.729	.466	3 (0.2-7)	1 (0.3-4)	-3.111	.002	2 (0.2-7)	1 (0.3-4)	-1.543	.123
PC use (hours/day) ^a	2 (0.5-12)	1 (0.5-12)	-2.442	.015	2 (1-12)	2 (0.5-8)	-1.660	.097	2 (0.5-12)	1 (0.5-8)	-1.944	.052
SP use (hours/day) ^a	3 (1-10)	2 (0-15)	-3.096	.002	3 (0.5-12)	1 (0-15)	-2.667	.008	3 (0.5-12)	1 (0-15)	-3.602	.000
DSM-5 diagnosis			2.094	.148			.039	.844			1.362	.243
ADHD	28 (60.9)	37 (47.4)			33 (51.6)	32 (53.3)			43 (56.6)	22 (45.8)		
Not-ADHD	18 (39.1)	41 (52.6)			31 (48.4)	28 (46.7)			33 (43.4)	26 (54.2)		
K-SADS diagnosis												
In ADHD (n=65)			4.196	.041			3.519	.061			2.750	.097
Diagnosis present	17 (60.7)	11 (39.3)			19 (57.6)	11 (34.4)			23 (53.5)	7 (31.8)		
No diagnosis	13 (35.1)	24 (64.9)			14 (42.4)	21 (65.6)			20 (46.5)	15 (68.2)		
In Control (n=59)			.571	.450			.067	.795			.005	.945
Diagnosis present	3 (16.7)	15 (83.3)			4 (12.9)	3 (10.7)			4 (12.1)	3 (11.5)		
No diagnosis	4 (9.8)	37 (90.2)			27 (87.1)	25 (89.3)			29 (87.9)	23 (88.5)		

CB: Cyberbullies, CV: Cybervictims, CB/CV: Cyberbully-victims, NET: The Internet, SP: Smartphone, PC: Personal computer

^a: Median (minimum-maximum)

The Comparison of ADHD and Controls on the basis of Discriminant Analysis

The majority of the adolescents those who are the cyberbullies (n=46) came from ADHD group (60.9%, n=28) and 39.1% (n=18) was from the controls. Of 51.6% (n=33) adolescents whom they were cyber-victims had ADHD in the cyber-victim group (n=64). Among the adolescents whom they were in the cyberbully-victim cycle (n=76), 56.6% (n=43) had diagnosed with ADHD. In cyberbullies group (n=46) OCS scores were similar between ADHD and Controls (for all $p > .05$, see Table 2). On the other hand, the SRS scores – for all subscales – were found as significantly higher in ADHD compared to the controls (for all $p < .05$, see Table 2).

In not-cyberbullies group (n=78), OCS subscores of loneliness/depression ($t(76)=2.179$, $p=.032$) and diminished impulse control ($t(76)=2.309$, $p=.024$) was significantly

higher in ADHD compared to the controls. Similar to that of the cyberbullies, All SRS scores of not-cyberbullies whom had ADHD were found higher than that of the controls (for all $p < .05$, see Table 2). Having clinical importance of social responsiveness was also higher in the not-cyberbullies of ADHD subjects compared to the controls (45.9% vs. 9.8; $\chi^2(1) = 12.947$, $p < .001$) (see Table 2).

As regards the cyber victims (n=64), only OCS subscores of diminished impulse control of ADHD subjects were significantly higher compared to the controls ($t(62)=2.202$, $p=.031$). On the other hand, all the SRS scores of ADHD subjects were found as significantly higher than that of the control (for all $p < .05$, see Table 2). In contrary to the cyberbullies group, the cyber-victims of ADHD subjects were significantly higher clinic problematic social reciprocity rates than that of controls (63.6% vs. 16.1%; $\chi^2(1) = 14.956$, $p < .001$).

Table 2. Online cognition scale (OCS) and Social reciprocity scale (SRS) scores regarding cyber-issues based between ADHD and control groups

	Cyberbullies (n=46)			Not-cyberbullies (n=78)			Cyber-victims (n=64)			Not-cyber victims (n=60)			Cyberbully-victims (n=76)			Not-CB-CV (n=48)		
	ADHD	CTRL	p	ADHD	CTRL	p	ADHD	CTRL	p	ADHD	CTRL	p	ADHD	CTRL	p	ADHD	CTRL	p
	n = 28	n = 18		n = 37	n = 41		n = 33	n = 31		n = 32	n = 28		n = 43	n = 33		n = 22	n = 26	
OCS^a																		
L/D	18.1 (7.6)	17.3 (6.1)	.738	14.9 (7.0)	11.7 (5.9)	.032	16.8 (7.6)	15.4 (7.1)	.473	15.7 (7.2)	11.1 (5.0)	.007	17.1 (7.3)	15.3 (6.9)	.274	14.6 (7.3)	11.0 (5.1)	.055
IC	37.2 (11.8)	30.3 (10.9)	.056	27.3 (10.5)	22.1 (9.4)	.024	34.2 (11.6)	27.6 (12.2)	.031	28.9 (12.1)	21.3 (7.2)	.005	34.5 (11.0)	27.5 (11.8)	.010	25.9 (12.1)	20.9 (7.3)	.089
SC	43.3 (13.2)	39.4 (13.4)	.336	35.5 (15.7)	29.3 (14.0)	.069	40.6 (13.2)	37.1 (15.3)	.327	37.1 (16.8)	27.2 (11.8)	.012	41.4 (12.9)	36.9 (15.0)	.167	34.0 (17.9)	26.6 (11.7)	.098
D	27.5 (9.8)	25.0 (7.0)	.359	17.9 (9.5)	17.5 (8.1)	.829	24.8 (10.6)	22.8 (8.9)	.418	19.2 (10.1)	16.4 (6.7)	.228	24.8 (10.0)	22.7 (8.6)	.347	16.6 (10.0)	16.0 (6.8)	.806
Total	126.0 (35.1)	112.2 (30.7)	.181	95.8 (37.3)	80.7 (34.8)	.068	116.4 (36.3)	103.1 (38.7)	.162	101. (40.9)	76.1 (28.0)	.009	117.8 (33.8)	102.5 (37.9)	.068	91.2 (43.5)	74.8 (28.1)	.122
SRS^a																		
SI	48.9 (15.6)	37.0 (11.2)	.007	45.0 (14.8)	33.4 (12.1)	.000	51.3 (15.7)	34.9 (11.8)	.000	41.9 (13.2)	34.0 (12.1)	.020	49.9 (15.3)	35.8 (12.1)	.000	40.3 (12.8)	32.8 (11.6)	.039
CI	5.5 (3.8)	3.3 (2.0)	.031	4.8 (2.5)	2.8 (2.8)	.001	5.8 (3.2)	3.2 (2.4)	.001	4.4 (2.9)	2.6 (2.7)	.017	5.6 (3.5)	3.3 (2.4)	.002	4.0 (1.9)	2.4 (2.8)	.027
S	10.7 (6.6)	7.1 (3.3)	.043	8.0 (5.0)	5.6 (4.3)	.023	11.1 (6.3)	6.5 (4.3)	.001	7.2 (4.7)	5.5 (3.8)	.151	10.6 (6.1)	6.7 (4.2)	.003	6.3 (4.0)	5.2 (3.7)	.341
A-R	10.6 (5.5)	7.3 (3.0)	.029	9.1 (2.6)	6.8 (2.8)	.000	10.9 (5.1)	6.9 (3.1)	.000	8.5 (2.4)	7.0 (2.6)	.026	10.5 (4.7)	7.1 (3.1)	.001	8.2 (2.1)	6.7 (2.5)	.032
AK	7.5 (5.7)	4.3 (3.1)	.038	5.8 (3.5)	4.1 (3.1)	.029	7.4 (4.7)	4.2 (3.4)	.003	5.5 (4.3)	4.1 (2.8)	.149	7.3 (5.0)	4.4 (3.4)	.005	4.8 (2.9)	3.8 (2.7)	.246
Total	65.1 (24.3)	47.5 (15.4)	.009	58.0 (21.3)	41.8 (17.5)	.000	68.3 (23.8)	44.7 (17.1)	.000	53.5 (19.3)	42.2 (16.9)	.020	66.4 (23.5)	46.0 (17.3)	.000	50.7 (17.4)	40.5 (16.3)	.041
SRS, n (%)			.051			.000			.000			.042			.001			.015*
Normal	12 (42.9)	13 (72.2)		20 (54.1)	37 (90.2)		12 (36.4)	26 (83.9)		20 (62.5)	24 (85.7)		18 (41.9)	26 (78.8)		14 (63.6)	24 (92.3)	
Cut-off	16 (57.1)	5 (27.8)		17 (45.9)	4 (9.8)		21 (63.6)	5 (16.1)		12 (37.5)	4 (14.3)		25 (58.1)	7 (21.2)		8 (36.4)	2 (7.7)	

OCS: Online cognition scale, L-D: Loneliness/depression, IC: Impulse control, SC: Social comfort, D: Distraction
 SRS: Social reciprocity scale, SI: Social impairment, CI: Communication issue, S: Stereotypes, A-R: ADHD-related, AK: Autism key
 *: Mean (standard deviation), *: Fisher's exact test

In not-cyber victims group (n=60), the OCS subscales (except distraction) were significantly higher in ADHD group compared to the control (for all $p < .05$, see Table 2). The total SRS scores and the subscales of social impairment, communication problems, ADHD-related scores were also significantly higher in the ADHD (for all $p < .05$, see Table 2). Similar to the cyber victims of ADHD, the not-cyber victims subjects who diagnosed with ADHD had significantly higher rate of clinic social reciprocity problems (37.5% vs. 14.3%; $\chi^2 (1) = 4.115$, $p = .042$).

Last group as the being in the cyberbully-victims (n=76), only OCS subscores of impulse control was significantly higher in the ADHD group (34.5 vs. 27.5, $p = .010$). All SRS scores were found higher in the ADHD group with being in the cyberbully-victims than that of the controls (for all $p < .05$, see Table 2). Pathologic SRS also was found at higher rate in ADHD (58.1% vs. 21.2%, $p = .001$).

Adolescent those who were in not-cyberbully-victim group (n=48) had similar OCS scores both either ADHD or control subjects. On the other hand, the

total scores of SRS scale and the subscores of social impairment, communication problems, ADHD related were significantly higher (for all $p < .05$, see Table 2). Pathologic SRS issue was also at higher rate in ADHD (36.4 vs. 21.2%, $p = .015$, Fisher's exact test).

Correlation analyses of Online Cognition Scale (OCS) and Social Reciprocity Scale (SRS) scores with Cyber bullying scale (CBS) and Cyber Victimization Scale (CVS) in the ADHD Subjects

In the ADHD group, all subscores of the online cognition scale (OCS) was found as correlated with cyber bullying scale scores (for all $p < .05$) whereas only distraction scores of the OCS scale was correlated with cyber victimization scale scores ($r = .262$, $p = .035$, see Table 5). Adolescents with ADHD had no correlation between their social reciprocity scale (SRS) scores and Cyberbullying scale (CBS) scores (for all $p > .05$) whereas the SRS total scores, stereotypes and ADHD-related subscores were correlated with cyber-victimization scale scores ($p < .05$, see Table 5).

Table 3. The relation of Online cognition scale (OCS) and Social Reciprocity scale (SRS) scores with the Cyber bullying/cyber victimization scales in ADHD group

	Cyber bullying scale (CBS) total scores		Cyber victimization scale (CVS) total scores	
	Spearman rho	p value	Spearman rho	p value
OCS subscale scores				
Loneliness/depression	.299	.015	.057	.654
Impulse control	.440	.000	.193	.123
Social comfort	.414	.001	.139	.269
Distraction	.464	.000	.262	.035
Total	.513	.000	.191	.128
SRS subscale scores				
Social impairment	.130	.301	.227	.069
Communication issue	.025	.841	.172	.172
Stereotypes	.139	.268	.341	.005
ADHD-related	.203	.105	.309	.012
Autism key	.116	.356	.171	.174
Total	.128	.308	.260	.036

DISCUSSION

This is the very first study in the literature to investigate the relationship of on-line cognition or social reciprocity with being cyberbully or cyber – victim in adolescents with ADHD.

Among demographics, the internet presence at home

was found related with being in cyberbully-victims and being cyber-victim. Smartphone presence was significantly higher in the group exhibiting cyber-bullying behaviors. The median value of the smartphone use (years) was found to be higher in the cyber-victim group. The median daily hours of smartphone use was significantly higher in cyberbully-victim group. Similar

to this, the cyber-victims were using more hours with their smartphone compared to the not-cyber-victims. On the other hand, the cyberbullies were found to be spending more time on a daily basis with their personal computer and their smartphones. In a study conducted in our country, the period of using the internet weekly was found to be predicting of cyber victimization (27). In another study conducted by Beran and Li (8), there was poor but meaningful relation between the frequency of internet use and cyberbullying, and there is no relation between being a cyber victim and internet usage frequency. In another study, there was no direct relationship between the frequency of using the internet and cyber-victimization, implying there could be the existence of intermediary factors (28). Contrary to these, some other studies proved that there is a relationship between excessive internet use in children and adolescents and cyber bullying and victimization (29, 30). According to these findings, there is a need for further studies on the relationship between internet use time and being cyber bully-victims.

In our sample, there was no difference between ADHD or control in terms of being cyberbullies, or cyber-victims, or cyberbully-victims. There is evidence in the literature about the relationship between ADHD and cyber bullying (10,14,31) though these studies have limitations such as heterogeneous diagnostic groups being investigated and no control group being involved. The presence of K-SADS diagnosis was significantly higher in those with ADHD group and cyber bullying behavior which supports the other studies in the literature (6,7,8,32).

When the ADHD cases were examined in terms of psychiatric diagnosis, no significant relationship was found with the being cyber-victims, contrary to the other studies pointing out the psychological consequences of the cyber-victimization (8,32).

All subscales of the Online cognition scale (OCS) scores (except distraction) were found to be higher in ADHD group than that of controls. Distraction includes using the internet to escape / avoid an activity that needs to be carried out. In a study from Turkey (33), it was found that the mean scores of all subscales and total scores of the OCS of the ADHD group were significantly higher than that of the control group.

It was determined that in ADHD group there was a relation between cyber bullying scale total scores and total scores of the online cognition scale and its loneliness/depression, diminished impulse control, social comfort and distraction subscores. Cyber bullies

with ADHD had more higher scores of diminished impulse control, social comfort and distraction and it was found as statistically significant. These findings could indicate that the increase in the value attributed to the internet can predict cyber bullying behavior. A study, from Korea, conducted with 4531 adolescents aged 11-14 years reported to be related to the problematic internet use with being a bully, a victim and a bully-victim (34). Online cognition impulsivity subscale scores were significantly higher in ADHD compared to the control in being cyberbully-victim and being cyber-victim pointing out that impulsivity is a major factor for victimization and being cyberbully-victim. It was also found that the scores of loneliness/depression and impulse control were significantly higher in the child-adolescents with ADHD without cyber-bullying behaviors. Noticeably, there was similar online cognition scores between cyberbullies in both the controls and ADHD group.

In the ADHD, the distribution of the SRS scale scores was found to be significantly higher in all with or without cyberbullying behaviors compared with controls. Nonetheless, only significance was found in adolescents with ADHD whom they did not exhibit cyberbullying behavior in terms of problematic social reciprocity. There was also an association between cyber-victimization total scores and stereotypes, ADHD-related symptoms and total scores of the social reciprocity scale. In a study, conducted by Didden et al. (31), there was no significant difference between autism spectrum disorder and control group in terms of cyberbullying. Kowalski and Fedina (15), reported that cases with ADHD and/or Asperger syndrome were found both as being traditional and cyber bullying victims. This area needs for further investigations.

ADHD is a risk for being cyber bullies or victims. In a population-based survey (13-16 years of age), hyperactivity, assigned with "Strength and difficulties questionnaire", was correlated with being cyber-victims and social reciprocity was found as problematic in hyperactive subjects (35). There are significant relationship between disruption in social reciprocity and cyber victimization and this finding supports our hypothesis. It has been also reported that victims of cyber bullying have low self-esteem, have social and emotional problems (36). This finding suggests that use of the internet, which functions to divert from daily routines and problems, could predict cyber victimization. In our study, it was found that children with ADHD had higher scores of total and subscores of the SRS than that of the control group, and problematic social reciprocity

was significantly higher in ADHD subjects with being cyber-victims or being in the cyber bully/victim cycle, pointing out that ADHD relates with social deterioration in terms of being cyber victim or being in the bully/victim cycle.

Limitations and Strengths: In our research, the relationship of cyberbullying or cyber-victims with social responsiveness and online cognition was emphasized in ADHD group. However, many other individual and environmental factors that do not fall within the scope of our research may be related to cyberbullying and victimization. In addition, the study group included only ADHD cases on clinical sample. Studies conducted in the population-based sample may result in different findings. The information and results obtained in the research are limited to the scale forms used. Information on bullying-victimization was only obtained from adolescents who participated in the investigation. These situations constitute the main limitations of this research. On the other hand, this study has also some strengths as including a control group matched in terms of age, gender, and socioeconomic level and using a culture-specific developed cyber bullying and victimization measurement tool by performing a power analysis.

In conclusion, this is the first study investigating the relationship between problematic internet use and social reciprocity and cyber bullying-victimization among children with ADHD. Our findings could support the other studies to design and investigate for effective and consistent interventions in ADHD to prevent being cyber bully or victim. It is important to evaluate the cases in this respect and to develop intervention programs related to safe internet usage. It would be appropriate for parents, educators and clinicians to be informed about the risks that young people in this group are carrying. Social interventions addressing to solve this issue might be helpful for not-being cyberbully or cyber-victim in adolescents with ADHD. Further studies are to be needed.

REFERENCES

- [1] Ayas T, Horzum MB. Cyber Bully/Victim Scale development study. *Akademik Bakış Journal*. 2010; 19:1-17.
- [2] Kowalski R, Limber S, Agatston P. *Cyber bullying: Bullying in the digital age*. Malden, MA: Blackwell Publishing. 2008.
- [3] Ybarra ML, Espelage DL, Mitchell KJ. The co-occurrence of internet harassment and unwanted sexual solicitation victimization and perpetration: associations with psychosocial indicators. *Journal of Adolescent Health*. 2007; 41:31-41. DOI: 10.1016/j.jadohealth.2007.09.010.
- [4] Ybarra ML, Diener-West M, Leaf PJ. Examining the overlap in internet harassment and school bullying: implications for school intervention. *Journal of Adolescent Health*. 2007; 41:42-50. DOI:10.1016/j.jadohealth.2007.09.004.
- [5] Juvonen J, Gross EF. Extending the school grounds? Bullying experiences in cyberspace. *Journal of School Health*. 2008; 78:496-505. DOI:10.1111/j.1746-1561.2008.00335.x.
- [6] Aricak OT. Psychiatric symptomatology as a predictor of cyberbullying among university students. *Eurasian Journal of Education Research*. 2009; 34:167-184.
- [7] Meadows B, Bergal J, Helling S, Odell J, Pilligian E, Howard C, Lopez M. *The Web: The bully's new playground*. People. 2005; 63:152-156.
- [8] Beran T, Li Q. Cyber-harassment: a study of a new method for an old behavior. *Educational Computing Research*. 2005; 32:265-277. DOI: 10.2190/8YQM-B04H-PG4D-BLLH
- [9] Wiener J, Mak M. Peer victimization in children with attention-deficit/hyperactivity disorder. *Psychology in the Schools*. 2009; 46:116-131. DOI: 10.1002/pits.20358.
- [10] Kowalski RM, Fedina C. Cyber bullying in ADHD and Asperger Syndrome populations. *Research in Autism Spectrum Disorders*. 2011; 5:1201-1208. DOI:10.1016/j.rasd.2011.01.007.
- [11] Holmberg K, Hjern A. Bullying and attention-deficit/hyperactivity disorder in 10-year-olds in a Swedish community. *Developmental Medicine & Child Neurology*. 2008; 50:134-138. DOI: 10.1111/j.1469-8749.2007.02019.x.
- [12] Yang SJ, Stewart R, Kim JM, Kim SW, Shin, I. S., Dewey, M. E., Yoon, J. S. Differences in predictors of traditional and cyber-bullying: a 2-year longitudinal study in Korean school children. *European Child & Adolescent Psychiatry*. 2013; 22(5):309-318. DOI: 10.1007/s00787.012.0374-6.
- [13] Hinduja S, Patchin JW. Cyberbullying: An exploratory analysis of factors related to offending and victimization. *Deviant Behavior*. 2008; 29:129-156. DOI: 10.1080/016.396.20701457816.
- [14] Yen CF, Chou WJ, Liu TL, Ko CH, Yang P, Hu HF. Cyberbullying among male adolescents with attention-deficit/hyperactivity disorder: Prevalence, correlates, and association with poor mental health status. *Research in Developmental Disabilities*. 2014; 35(12):3543-3553.
- [15] Heiman T, Olenik-Shemesh D, Eden S. Cyberbullying involvement among students with ADHD: relation to loneliness, self-efficacy and social support. *European Journal of Special Needs Education*. 2015; 30:15-29. DOI: 10.1080/08856.257.2014.943562.
- [16] Kowalski RM, Morgan CA, Drake-Lavelle K, Allison B. Cyberbullying among college students with disabilities. *Computers in Human Behavior*. 2016; 57:416-427. DOI: 10.1016/j.chb.2015.12.044.
- [17] American Psychiatric Association *Diagnostic and Statistical Manual of Psychiatric Disorders, fifth edition*. DSM-5. Washington DC, 2013.
- [18] G*Power 3.1.8. Franz Faul, Universitat Kiel, Germany 1992.
- [19] Kaufman J, Birmaher B, Brent D. Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of American Academy of Children and Adolescent Psychiatry*. 1997; 36:980-8. DOI: 10.1097/00004.583.199707000-00021.

- [20] Gokler B, Unal F, Pehlivanurk B, Cengel Kultur E, Akdemir D, Taner Y. Reliability and validity of Schedule for affective disorders and schizophrenia for school-age children present and lifetime version-Turkish version. *Turkish Journal of Child and Adolescent Mental Health*. 2004; 11:109-16.
- [21] Aricak OT, Kinay H, Tanrikulu T. Initial Psychometric Findings of Cyberbullying Scale. *Hasan Ali Yücel Eğitim Fakültesi (HAYEF): Journal of Education*. 2012; 9:101-114.
- [22] Aricak OT, Tanrikulu T, Kinay H. Initial Psychometric Findings of Cyber Victimization Scale. *Mediterranean Journal of Educational Research*. 2012; 2:1-6.
- [23] Davis RA, Gordon LF, Avi B. Validation of a new scale for measuring problematic Internet use: Implications for pre-employment screening. *Cyberpsychology & Behavior*. 2002; 5:331-345. DOI: 10.1089/109.493.102760275501.
- [24] Ozcan NK, Buzlu S. An assistive tool in determining problematic internet use: validity and reliability of the "Online Cognition Scale" in a sample of university students. *Journal of Dependence*. 2005; 6:19-26.
- [25] Constantino JN, Przybeck T, Friesen D. Reciprocal social behavior in children with and without pervasive developmental disorders. *Journal of Developmental and Behavioral Pediatrics*. 2000; 21:2-11.
- [26] Ayaz AB, Ayaz M, Yazgan Y. Alterations in social reciprocity in attention deficit hyperactivity disorder. *Turkish Journal of Psychiatry*. 2013; 24:101-110. DOI: 10.5080/u6800
- [27] Peker A, Eroglu Y, Ada S. The investigation of predictors of cyberbullying and cybervictimization in adolescents. *Abant İzzet Baysal University Journal of Faculty of Education*. 2012; 12:185-206.
- [28] Erdur-Baker O. Cyber bullying and its correlation to traditional bullying, gender and frequent and risky usage of internet mediated communication tools. *New Media and Society*. 2010; 12:109-125. DOI: 10.1177/ 146.144.4809341260.
- [29] Floros GD, Siomos KE, Fisoun V, Dafouli E, Geroukalis D. Adolescent online cyberbullying in Greece: The impact of parental online security practices, bonding, and online impulsiveness. *Journal of School Health*. 2013; 83:445-453. DOI:10.1111/josh.12049.
- [30] Smith PK, Mahdavi J, Carvalho M, Fisher S, Russell S, Tippett N. Cyberbullying: Its nature and impact in secondary school pupils. *Journal of Child Psychology and Psychiatry*. 2008; 49(4):376-385.
- [31] Didden R, Scholte R, Korzilius H, DeMoor J, Vermeulen A, O'Reilly M. Cyberbullying among students with intellectual and developmental disability in special education settings. *Developmental Neurorehabilitation*. 2009; 12:146-151. DOI: 10.1080/175.184.20902971356.
- [32] Wolak J, Mitchell K, Finkelhor D. *Online victimization: 5 years later*. Alexandria, VA: National Center for Missing & Exploited Children. University of New Hampshire, 2006.
- [33] Cakmak FH, Gul H. Factors associated with problematic internet use among children and adolescents with Attention Deficit Hyperactivity Disorder. *Northern Clinics of Istanbul*. 2018; 5(4):302-313.
- [34] Jung YE, Leventhal B, Kim YS, Park TW, Lee SH, Lee M, Park, J. I. Cyberbullying, problematic internet use, and psychopathologic symptoms among Korean youth. *Yonsei Medical Journal*. 2014; 55(3):826-830.
- [35] Sourander A, Klomek AB, Ikonen M, Lindroos J, Luntamo T, Koskelainen M, Helenius H. Psychosocial risk factors associated with cyberbullying among adolescents: A population-based study. *Archives of General Psychiatry*. 2010; 67: 720-728. DOI: 10.1001/archgenpsychiatry.2010.79.
- [36] Yaman E, Eroğlu Y, Peker A. Coping strategies and school bullying and cyberbullying [Başa çıkma stratejileri ile okul zorbalığı ve siber zorbalık]. *Kaknüs Press*, 2011. [Turkish].