

ORIGINAL RESEARCH

Is Problematic Media Use a Marker for Aggression in Children with Attention Deficit/Hyperactivity Disorder?

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Abstract

Objective: Attention Deficit/Hyperactivity Disorder (ADHD) is associated with a series of problems, including aggressive behavior and problematic media use (PMU). However, the literature concerning the relationship between PMU and aggressive behavior patterns in children diagnosed with ADHD is limited. This study examines the relationships between PMU and aggression in children with ADHD.

Methods: One hundred sixty-two children aged 6-12 years diagnosed with ADHD were included in the study. All participants were assessed with DSM-5-based psychiatric evaluations. Aggressive behaviors in children were evaluated using the Children's Aggression Scale Parent Version (CAS-P). The children's screen use was scored using the Problematic Media Use Measure Short Form (PMUM-SF). The data obtained were compared using statistical methods.

Results: A significant correlation at the $p < .05$ level was determined between PMU and the severity of ADHD (mild-moderate and severe). PMU was positively and statistically significantly correlated with verbal aggression ($r = 0.422$, $p < 0.001$), aggression against objects and animals ($r = 0.367$, $p < 0.001$), provoked physical aggression ($r = 0.365$, $p < 0.001$) and unprovoked physical aggression ($r = 0.283$, $p < 0.001$). In addition, PMU significantly ($p < 0.001$) predicted verbal aggression, aggression against objects and animals, and provoked and unprovoked physical aggression.

Conclusion: A positive correlation was observed between PMU in children and the risk of aggression in this group, and PMU predicted aggression. These findings may contribute to the formation of guidelines for intervention when problematic behaviors emerge in children diagnosed with ADHD.

Keywords: Children, Problematic Media Use, Attention-Deficit/Hyperactivity Disorder, Aggression, Digital Media

INTRODUCTION

Attention-deficit / hyperactivity disorder (ADHD) is a ubiquitous neurodevelopmental disorder leading to varying degrees of impairment in functionality and characterized by lack of attention, hyperactivity, and impulsivity (1). Although studies have reported differing prevalence rates, a generalized pooled estimate of approximately 8% has been reported in childhood (1, 2). Children diagnosed with ADHD may frequently exhibit aggressive behavior, and such behavior has a widespread disruptive effect on the clinical manifestation (3, 4). ADHD symptoms and aggression are both heterogeneous, and

ADHD symptoms have been linked to different types of aggressive behavior (5).

Increasing access to screen use has made problematic screen use (PMU) among children a widespread cause for concern. PMU is defined as the use of devices that permit access to the media in such a way as to adversely affect important daily living activities (6). Excessive use of the digital media by children and adolescents appears to be an important factor capable of preventing the development of healthy psychophysiological resilience (7). The increase in problematic and aggressive behaviors

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in children has previously been reported to be associated greater screen time (8). Additionally, reducing children's media use has been described as potentially beneficial, and a program aimed at reducing media use has been reported to reduce aggressive behavior in children (9). Children with ADHD exhibit more severe PMU than clinical controls without ADHD (10). The relationships between psychiatric disorders, especially ADHD, and excessive media use, and the severity of ADHD and the amount of use in particular have both been confirmed (11).

Our examination of the relationship revealed two-way relationships between ADHD and aggression, between ADHD and screen use, and between screen use and aggression. The hypothesis of the present study was that there is a positive linear correlation between the variables of PMU and aggression in children with ADHD. The purpose of this study was therefore to examine the relationship between aggression and screen use in children aged 6-12 years diagnosed with ADHD.

METHODS

Study Population

This study was performed with 161 children aged 6-12 years under follow-up with diagnoses of ADHD. All participating children underwent psychiatric evaluations based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR). These were performed by experienced specialists in child and adolescent mental health and diseases. The research was completed between December 2022 and March 2023. Written and verbal consent was obtained from the families of all participating children. Children with known psychiatric or physical diseases were excluded. Children diagnosed with any other psychiatric disorder as a result of the DSM-5-TR-based psychiatric evaluations were also excluded. Families with difficulties in reading or understanding the forms or not completing the evaluation process were also not included. All participating families' sociodemographic characteristics were obtained during interviews using a form prepared by the authors. The Problematic Media Use Measure Short Form (PMUM-SF, nine items) was employed to estimate screen dependency among the children in the study population. The Children's Aggression Scale-Parent Version (CAS-P) was used to determine the level and variety of aggressive behavior in the children. Approval for the study was granted by the Alanya Alaaddin

Keykubat University clinical research ethical committee (no. 15-05).

Psychometric Instruments

Problematic Media Use Measure Short Form (PMUM-SF, nine items)

This is used to evaluate screen dependence in children. The scale is scored by parents for children aged 4-13 years. The PMUM-SF consists of nine items, the scores for which are added to yield a total scale score. The nine Likert-type items investigate problematic use of media, and each is scored as follows: 1=never, 2=rarely, 3=sometimes, 4=very often, and 5=always. The higher the total score, the higher the level of PMU (6). The Turkish-language version of the form was validated by Furuncu and Öztürk (12).

The Children's Aggression Scale-Parent Version (CAS-P)

This scale was developed by Halperin et al. to evaluate the frequency and severity of aggression in children and adolescents and to differentiate this from destructive behaviors (13). The scale is completed by parents. This five-point Likert-type scale consists of 33 items. In terms of determining frequency and severity, the options are 'never, once or twice, 3-5 times, 6-10 times, and more than 10 times.' The domains investigated are verbal aggression, aggression against objects and animals, provoked physical aggression, initiated physical aggression, and the use of weapons. However, four factors are employed in the Turkish-language adaption, with use of weapons being excluded. The validity and reliability of the Turkish-language version were studied by Ercan et al. (14).

Statistical Analysis

Frequency and percentage values were calculated for categorical variables. Continuous variables were expressed as mean, standard deviation, and median values. Normality of distribution of variables was examined using skewness and kurtosis results and graphical methods (histogram, Q-Q plot). Results in a ± 2 range for skewness and kurtosis values were regarded as normal distribution. Relationships between normally distributed results were interpreted using Pearson correlation coefficients, and relationships between non-normally distributed parameters were examined using Spearman correlation coefficients. Comparisons of results meeting normal distribution criteria in paired groups were performed using the independent samples

t test. Homogeneity of variance was evaluated using the Levene test. A priori normality, multiple co-collinearity, and covariance analyses were performed for the regression models established. Linearity analysis was evaluated using variance inflation factor (VIF) values. Although normal distribution is essential in the model requirements, the regression analysis is quite resistant to violation of the normality assumption. In addition, the data transformation procedure gives rise to bias. It is therefore recommended that, if the number of participants is sufficient, the analysis be performed in its current state rather than using data transformation (15). Unprovoked physical aggression was therefore included in the regression model as a dependent variable. All analyses were performed using SPSS version 22 software (IBM Corp.; Armonk, NY, USA). Results lower than 0.05 were regarded as statistically significant.

RESULTS

The study was performed with 162 participants aged 6-12 years and a mean age of 8.99 (1.78). Boys comprised 120 (74.1%) of the participants and girls 42 (25.9%). Twenty-six cases (16%) were classified as mild ADHD, 70 (43.2%) as moderate, and 66 (40.7%) as severe. Descriptive statistics of the scales employed were calculated, and all results, with the exception of unprovoked aggression, were found to exhibit normal distribution when evaluated using skewness and kurtosis values and graphical methods (Table 1).

Table 1. Descriptive Statistics of Variables Regarding CAS-P Subscale Scores and PMUM-SF

	Mean (Min-Max)	Standard deviation	Skewness	Kurtosis
Verbal aggression	12.06 (0-48)	10.485	1.452	1.905
Aggression against objects and animals	2.72 (0-12)	2.412	1.258	1.505
Provoked aggression	5.25 (0-21)	4.789	1.042	.519
Unprovoked aggression	2.97 (0-19)	3.662	2.131	5.648
Problematic media use	25.96 (9-45)	9.804	-0.025	-0.927

Problematic Media Use Measure Short Form (PMUM-SF), Children's Aggression Scale-Parent Version (CAS-P)

The independent samples t test was applied to determine whether PMU differed in terms of sex or maternal and

paternal education levels. No significant difference was determined between girls (24.17 ± 10.56) and boys (26.58 ± 9.49) ($p = 0.170$). No significant difference in PMU was also observed in terms of maternal or paternal education levels ($p = 0.629$ and $p = 0.604$, respectively). However, PMU scores were significantly higher in the severe ADHD group (28.30 ± 10.38) than in the mild-moderate ADHD group (24.34 ± 9.09) ($p = 0.011$). The study variables of age ($r = 0.171$, $p = 0.029$), verbal aggression ($r = 0.422$, $p < 0.001$), aggression against objects and animals ($r = 0.367$, $p < 0.001$), provoked physical aggression ($r = 0.365$, $p < 0.001$), and unprovoked physical aggression ($r = 0.283$, $p < 0.001$), exhibited significant positive correlation with PMU (Table 2).

Table 2. Correlation Analysis Between PMUM-SF scale scores and CAS-P Subscale Scores

		Problematic media use
Verbal aggression	Pearson's r	0.422
	<i>p</i>	<0.001
Aggression against objects and animals	Pearson's r	0.367
	<i>p</i>	<0.001
Provoked physical aggression	Pearson's r	0.365
	<i>p</i>	<0.001
Unprovoked physical aggression ^a	Spearman's rho	0.283
	<i>p</i>	<0.001

Pearson Correlation Coefficients, Spearman Correlation Coefficients, Variables with $p < 0.05$ are shown in bold. Problematic Media Use Measure Short Form (PMUM-SF), Children's Aggression Scale-Parent Version (CAS-P)

Regression models were established containing the dependent variables of verbal aggression, aggression against objects or animals, and provoked or unprovoked physical aggression, and the independent variables of age, sex, and PMU. No multilinearity problem was observed (VIF values for independent variables between 1.081 and 1.102). The ANOVA results for the dependent variable regression models of verbal aggression, aggression against objects or animals, provoked physical aggression and unprovoked physical aggression were found to be significant ($F(4.157) = 14.501$, $p < 0.001$; $F(4.157) = 9.196$, $p < 0.001$; $F(4.157) = 11.121$, $p < 0.001$; $F(4.157) = 8.234$, $p < 0.001$, respectively)). Our analysis identified the independent variables of disease severity and PMU as significant predictors of verbal aggression, aggression against objects or animals, provoked physical aggression and unprovoked physical aggression (Table 3).

Table 3. Multiple Linear Regression Analysis for Variables Predicting Aggression

Predictors	Dependent Variable	B	SH (B)	β	t	p
	Verbal Aggression					
Constant		1.164	4.010	–	0.290	0.772
Age		-0.226	0.417	-0.038	-0.542	0.588
Sex		0.243	1.648	0.010	0.147	0.883
Disease severity		6.380	1.511	0.300	4.223	<0.001
PMUM-SF	$\Delta R^2=0.251$	0.396	0.077	0.370	5.167	<0.001
	Aggression against objects or animals					
Constant		1.395	0.972	–	1.435	0.153
Age		-0.142	0.101	-0.105	-1.404	0.162
Sex		-0.003	0.399	-0.001	-0.008	0.994
Disease severity		0.959	0.366	0.196	2.618	0.010
PMUM-SF	$\Delta R^2=0.169$	0.085	0.019	0.346	4.585	<0.001
	Provoked physical aggression					
Constant		1.065	1.892	–	0.563	0.574
Age		-0.135	0.197	-0.050	-0.687	0.493
Sex		0.657	0.778	0.060	0.845	0.400
Disease severity		2.786	0.713	0.287	3.908	<0.001
PMUM-SF	$\Delta R^2=0.201$	0.158	0.036	0.323	4.371	<0.001
	Unprovoked physical aggression					
Constant		1.068	1.490	–	0.716	0.475
Age		-0.177	0.155	-0.086	-1.143	0.255
Sex		0.062	0.612	0.007	0.101	0.919
Disease severity		1.844	0.561	0.248	3.285	0.001
PMUM-SF	$\Delta R^2=0.152$	0.105	0.028	0.281	3.693	<0.001

Problematic Media Use Measure Short Form (PMUM-SF), Variables with $p < 0.05$ are shown in bold.

DISCUSSION

The present research is the first study to investigate and test the relationships between PMU and aggression results in children aged 6-12 diagnosed with ADHD. The study results were consistent with our hypotheses. PMU exhibited a positive correlation with aggression in students with ADHD aged 6-12. Additionally, our results showed that PMU predicted verbal aggression, aggression against objects or animals, and provoked and unprovoked physical aggression in that age group.

Excessive screen time has been positively linked to behavioral and conduct problem and ADHD with significant dose-dependent relationships (16). Associations have also been reported between media use and ADHD symptoms (17,18). This relationship is a reciprocal one, and greater PMU has been reported in children with ADHD compared to control group children (19). Meta-analyses have also found a positive correlation between media use and ADHD-related behaviors (20). Consistent with previous research, the present study also determined an association between PMU and the severity of ADHD.

Our correlation analysis revealed increases in all the aggression sub-domains (verbal aggression, aggression against objects and animals, provoked physical aggression, and unprovoked physical aggression) in children with ADHD as PMU increased. Greater media use is known to increase the likelihood of subsequent aggressive behaviors (21, 22). Research has also reported that problematic behaviors and increased aggressive behaviors in children are associated with increased screen time (8). From a more theoretical perspective, young people who are raised in environments that ‘reinforce aggression, facilitate models of aggression, and regard aggression as acceptable’ may themselves develop aggressive tendencies (23). We also thought that the negative behaviors these young people witnesses might be associated with an increase in aggressive behaviors. Moreover, exposure to media with violent content has been shown to affect the brain via the right ventrolateral prefrontal cortex (rvLPFC) that plays a role in the regulation of aggressive impulses (24). This may have a greater neurological impact on children with ADHD than other children. In conclusion, we observed that aggressive behaviors in children with ADHD

increased in line with PMU. Moreover, our regression model based on the dependent variables of verbal aggression, aggression against objects and animals, and provoked and unprovoked physical aggression and on the independent variable of PMU identified such use as a significant predictor of all aggression sub-models.

The principal limitation of this study is its cross-sectional nature. Since the cause and effect relationship is examined in only one time period in such studies, any causal associations must be interpreted with caution. Another important limitation of our study is that treatment-related variables such as treatment duration and drug dose were not used in the study. In our study, ADHD severity status was evaluated only cross-sectionally at the time of examination. However, we also think that our large case number and the effectiveness of the evaluation tools represent particular strengths.

CONCLUSIONS

This study clearly revealed a number of important gaps in the ADHD literature. Although previous studies have focused have focused on the relationship between ADHD and aggression or PMU, we investigated the relationship between both these variables and a pediatric group diagnosed with ADHD. We found that PMU in the children was positively correlated with the risk of aggression and that PMU predicted aggression. These results will serve as a useful guide for professionals working with children diagnosed with ADHD. The results of our study may also contribute to the development of guidelines for interventions to be employed when or before aggressive behaviors emerge in these children.

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Author Contributions:

Research idea: TKara

Design of the study: TKara, OK, PAA

Acquisition of data for the study: TKara, OK, PAA

Analysis of data for the study: TKara, TKuru

Interpretation of data for the study: TKara, TKuru, OK, PAA

Drafting the manuscript: TKara, TKuru, OK, PAA

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