ORIGINAL ARTICLE

Psychiatry and Clinical Psychopharmacology 2021;31(1):19-24
DOI:10.5152/pcp.2021.20133

Relationship between Aggression and Psychoform and Somatoform Dissociation in Young Adults at Risk for Attention Deficit Hyperactivity Disorder

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ABSTRACT

Objective: Because aggressive behavior is observed in more than half of children and adolescents with attention deficit hyperactivity disorder (ADHD), it is essential to identify relating factors that explain this association in individuals who are susceptible to childhood trauma. This study aims to investigate the relationship between aggression and psychoform and somatoform dissociative experiences, while controlling for the effect of childhood trauma in young adults at risk for ADHD.

Materials and Methods: Participants were 137 university students who voluntarily completed a series of measurements, including a socio-demographic form, the Adult ADHD Severity Rating Scale (ASRS), the Childhood Trauma Questionnaire (CTQ), the Dissociative Experiences Scale (DES), the Somatoform Dissociation Questionnaire (SDQ), and the Buss-Perry Aggression Questionnaire (AQ). Based on ASRS scores, participants were divided into two groups: low and high risk for ADHD.

Results: CTQ ($d=0.54$; $P < .01$), DES ($d=0.85$; $P < .01$), SDQ ($d=0.78$; $P < .01$), and AQ ($d=0.72$; $P < .01$) scores were significantly higher in the high-risk ADHD group than in the low-risk group. Linear regression analyses revealed that in the high-risk group, hyperactivity/impulsivity ($t=2,75$; $P=.02$), body mass index ($t=2,85$; $P < .01$), and somatoform dissociation ($t=3,20$; $P < .01$) were statistically significant predictors of aggression.

Conclusion: When evaluating the trauma/dissociation process in individuals with ADHD, somatoform dissociation may be a significant predictor of aggression. Longitudinal studies in the clinical ADHD population are needed to confirm and clarify this relationship.

ARTICLE HISTORY

Received: 31 August, 2020
Accepted: 31 December, 2020

KEYWORDS: Aggression, attention deficit hyperactivity disorder, body mass index, childhood trauma, dissociation, somatoform dissociation

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity. ADHD symptoms are expected to begin in childhood; however, prominent symptoms persist into adulthood in approximately one-half of cases.[1] ADHD impairs functioning in academics, interpersonal relationships, and social activities and appears to facilitate development of several other psychiatric disorders, such as mood, anxiety, and substance use disorders.[2,3]

While intrauterine stress and childhood trauma have been implicated in the etiology of ADHD, the literature also suggests that individuals with ADHD are exposed to more childhood trauma in comparison to others without ADHD.[4,5]This bidirectional relationship between ADHD and childhood trauma highlights dissociative experience-a persistent outcome of childhood trauma-as a symptom to be investigated.[6]

Dissociation is the disruption and/or discontinuity of one or more mental functions expected to function synchronously, such as memory, consciousness, identity, body/environmental perception, motor control, or behavior. It is a defense mechanism that serves to reduce the anxiety associated with childhood trauma that is intolerable for the ego. Therefore, dissociative symptoms may accompany psychiatric disorders, even if they do not meet the criteria for dissociative disorder diagnosis.[7] Dissociation of executive functions is defined psychoform dissociation, while dissociation of body perception/representation is defined somatoform dissociation. The symptoms of ADHD have been shown to increase susceptibility to dissociative symptoms in childhood and adulthood.[8,9] In a study conducted in a clinical sample of 487 participants, dissociative and somatization symptoms were found to be higher in individuals at risk for ADHD compared to a healthy control group.[10] Despite these data, the relationship

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Cite this article as: Kandeğer A, Tekdemir R. Relationship between aggression and psychoform and somatoform dissociation in young adults at risk for attention deficit hyperactivity disorder. *Psychiatr Clin Psychopharmacol*. 2021; 31: 19-24.

between dissociation and ADHD has been studied less, especially in adults.

Aggression is defined as behavior aimed at harming a person or object. In a review published by Moskowitz, dissociative symptoms were reported to be associated with increased aggressive behavior in samples from a variety of populations, including university students, psychiatric inpatients and outpatients, military veterans, and criminal populations.[11] In a recent study of 117 university students that investigated the relationship between dissociative experiences and aggression, significant relationships were found between reactive aggression and both psychoform and somatoform dissociation.[12] Additionally, the relationship between childhood traumas and exposure to violence with dissociative symptoms has also been clearly demonstrated.[13]

Aggressive behavior is observed in more than half of children and adolescents with ADHD.[14] The reciprocal relationship between aggression and dissociative experiences can be observed more prominently in individuals with ADHD.[11] Aggression, which is associated with psychiatric comorbidity, lifelong decreased functioning, and antisocial behavior, is now considered a severe public health problem.[15] Therefore, it is essential to identify relating factors that account for the aggression observed in individuals with ADHD.

This study aims to investigate the relationships between aggression and psychoform and somatoform dissociative experiences in young adults at risk for ADHD while controlling for the effect of childhood trauma. Our first hypothesis is that both psychoform and somatoform dissociative experiences and aggression scores are greater in the high-risk ADHD group than in the low-risk ADHD group. Second, both psychoform and somatoform dissociative experiences are associated with aggression independent of ADHD symptoms.

MATERIALS AND METHODS

Procedure

This research was a cross-sectional study. Participants were 137 undergraduates from a state university located in the Central Anatolia region of Turkey. The volunteers completed a package of psychological instruments, including the socio-demographic form, Adult ADHD Severity Rating Scale (ASRS), Childhood Trauma Questionnaire (CTQ), Dissociative Experiences Scale (DES), Somatoform Dissociation Questionnaire (SDQ), and Buss–Perry Aggression Questionnaire (AQ) administered by two investigators in their classrooms. The present study protocol received approval from the Ethics Committee of the Faculty of Medicine, Selçuk University (Decision Number: 2020/197; Date: May 13, 2020). All participants were informed about the aims of the study, and written informed consent was obtained from participants. Participants who were found to have not completed the forms at the end of the data collection process were excluded from the study.

Measurements

Adult ADHD Self-Report Scale: Adult ADHD Self-Report Scale (ASRS) is an 18-question self-report scale that measures ADHD symptoms in adults based on the criteria of the *Diagnostic and Statistical Manual of Mental Disorders: Fourth Edition* (*DSM-IV-TR*).[16,17] The validity and reliability of the Turkish form have been demonstrated in two different studies.[18,19] Higher scores indicate higher ADHD symptoms. It is suggested that the cut-off score should be determined as 30, and this cutoff score is reported to correspond to sensitivity = 0.75, specificity = 0.79, Kappa = 0.44, positive predictive value = 0.46, and negative predictive value = 0.93.[18] The cutoff score was determined as 30, and thus the participants with an ASRS score higher than 30 were accepted as having ADHD risk in this study.

Childhood Trauma Questionnaire: The Childhood Trauma Questionnaire (CTQ) is accepted as an easy-to-use measurement tool based on self-report, showing validity and reliability, which is useful in retrospectively and quantitatively evaluating experiences of abuse and neglect before 20 years of age. Developed by Bernstein et al.,[20] the CTQ consists of 28 questions, three of which are items that measure the minimization of trauma. The scale consists of 5 sub-dimensions: emotional abuse, physical abuse, physical neglect, emotional neglect, and sexual abuse.[20] The Turkish version of the CTQ's validity and reliability has been performed with a Cronbach's alpha value of 0.93, which shows the internal consistency of the scale. The Gutmann half test coefficient was 0.97.[21]

Dissociative Experiences Scale: The Dissociative Experiences Scale (DES) originally measures dissociation along a continuum ranging from minor dissociative experiences such as absorption to pathological forms of dissociative symptomatology such as depersonalization-derealization and dissociative amnesia.[22,23] The DES had good validity and reliability.[24] The Turkish version of the scale was demonstrated to have excellent reliability and validity, with a Cronbach's alpha of $\alpha = 0.91$ and test-re-test correlation coefficient of $r = 0.78$.[25]

Somatoform Dissociation Questionnaire: The Somatoform Dissociation Questionnaire (SDQ) is a 20-item self-report scale used to assess somatoform dissociation. The scale investigating negative symptoms (anesthesia, analgesia and motor inhibitions) and positive symptoms (localized pain, taste change, and odor preferences/reluctance) can be scored in the range of 20-100.[26] The Turkish validity and reliability study was conducted by Sar et al.[27]

Buss-Perry Aggression Questionnaire: Buss–Perry Aggression Questionnaire (AQ) is one of the most widely used self-report scales that assess aggressive behavior. It is a 5-point Likert type scale consisting of 29 items.[28] The

Turkish version of the AQ has been found to be valid and reliable in substance dependents.[29]

Statistical Analyses

The data were entered using the Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM SPSS Corp.; Armonk, NY, USA.[30] First, descriptive statistics were made. Pearson correlation analysis was performed to investigate the correlation of the scores of the scales. During the statistical analysis, participants were divided into two groups with low and high ADHD risk, according to the recommended ASRS cutoff score. Independent variables *t*-test was used to compare numerical data between the two groups with low and high ADHD risk. Finally, linear regression analysis was performed to determine the parameters associated with aggression in the group with ADHD risk.

RESULTS

The mean age of the participants was 18.85 ± 0.9 years, ranging between 17 and 23. About 65.7 % of the sample were females ($n=90$), and 13.9% of the sample reported cigarette use ($n=19$), and 10.4 % of the sample reported alcohol use ($n=9$). When the scale scores between low and high risk ADHD groups were compared, ASRS ($d=4.22$; $P < .01$), CTQ ($d=0.54$; $P < .01$), DES ($d=0.85$; $P < .01$), SDQ ($d=0.78$; $P < .01$), and AQ ($d=0.72$; $P < .01$) scores were statistically significantly higher in the high-risk ADHD group. The comparison of demographic characteristics, and means and standard deviations of the ASRS, CTQ, DES, SDQ, and AQ between the ADHD low- and high-risk groups are presented in Table 1.

In the Pearson correlation analysis performed to determine the correlation between the total scores of the scales, there was a statistically significant and positive correlation between the ASRS, CTQ, DES, SDQ, and AQ scores (Table 2).

The linear regression analysis conducted to determine the predictors of aggression in the high-risk ADHD group revealed a significant regression equation ($F(9,41)=3.77$, P = 0,002), with an adjusted R^2 of 0.33. Additionally, increased body mass index (BMI; t = 2,85; $P < .01$), hyperactivity/impulsivity subscale of ASRS (t = 2,75; P = .02), and SDQ (t= 3; $P< .01$) scores were statistically significant predictors for aggression. Multicollinearity was evaluated in linear regression analysis and it was found that there was no correlation that could weaken the power of the model (Table 3).

When post hoc power analysis is performed for comparison of psychoform dissociation, somatoform dissociation, and aggression level in low- and high-risk groups for ADHD with alpha 0.05, the power of the study was found to be 0.992, 0.991, and 0.981, respectively.

DISCUSSION

This study investigated the relationships between aggression and both psychoform and somatoform dissociation in young adults at risk for ADHD while controlling for the effect of childhood trauma. CTQ, DES, SDQ, and AQ scores differed between the low- and high-risk ADHD groups. Significant positive correlations were found between ASRS scores and all other scale scores. Additionally, increased BMI, hyperactivity/impulsivity subscale of ASRS, and SDQ scores had a significant contribution to aggression scores.

Individuals at risk for ADHD had greater childhood trauma, dissociation, and aggression scores than the control group. Many studies have shown that individuals with ADHD are more prone to childhood trauma, dissociative experiences, and aggression.[5,14,31] Specifically, a recent study reported

Table 1. Demographic Data of the Sample and Means and Standard Deviations Of Measurement Tools According to ADHD risk ($N=137$)

		Low Risk of ADHD $n=86$, 62.8%		High Risk of ADHD $n=51$, 37.2%		t/χ^2	P
Age (years)[a]	(Mean, SD)	18.87	0.9	18.82	0.9	0.30	.76
Gender/Female[b]	(*N*, %)	60	69.8	30	58.8	1.70	.19
Cigarette use[b]	(*N*, %)	12	14	7	13.7	0.01	.57
Alcohol use[b]	(*N*, %)	5	5.8	4	7.8	0.22	.64
Body mass index[a]	(Mean, SD)	21.78	3.3	22.67	4.2	-1.38	.17
Prior psychiatric disorder[b]	(*N*, %)	6	7.0	9	17.6	3.74	.05
Adult ADHD Self-Report Scale[a]	(Mean, SD)	23.61	4.5	37.12	4.9	-16.41	**<.01**
Childhood Trauma Questionnaire[a]	(Mean, SD)	31.42	6.4	35.10	7.3	-3.09	**<.01**
Dissociative Experiences Scale[a]	(Mean, SD)	16.51	9.4	33.76	27.3	-4.36	**<.01**
Somatoform Dissociation Questionnaire[a]	(Mean, SD)	26.85	6.2	32.61	8.2	-4.35	**<.01**
Buss-Perry Aggression Questionnaire[a]	(Mean, SD)	35.12	15.9	46.88	16.8	-4.10	**<.01**

Note: Bold values denote statistical significance at the $P < .05$ level. [a]: independent t-test; [b]: χ^2 test; ADHD: Attention Deficit Hyperactivity Disorder.

Table 2. Pearson Product-Moments Correlation Coefficients

	1	2	3	4	5
ASRS	1.00				
CTQ	0.32**	1.00			
DES	0.44**	0.22**	1.00		
SDQ	0.38**	0.27**	0.33**	1.00	
AQ	0.43**	0.25**	0.24**	0.45**	1.00

Note: **P < .01; ASRS: Adult ADHD Self-Report Scale; CTQ: Childhood Trauma Questionnaire; DES: Dissociative Experiences Scale; SDQ: Somatoform Dissociation Questionnaire; AQ: Buss-Perry Aggression Questionnaire.

that physical abuse has a partial mediating role between ADHD symptoms and dissociation in 190 individuals with alcohol use disorders.[32] However, the specific relationship between somatoform dissociation and ADHD has not been previously studied.

While many studies show a relationship between childhood trauma and aggression,[33] most have been conducted with samples from populations frequently associated with aggression, such as male prisoners,[34] and individuals with borderline[31] or antisocial personality disorders[35]; few have studied healthy volunteers.[33,36] One study of 50 healthy volunteers reports that AQ scores were significantly positively correlated with emotional and sexual abuse scores as well as CTQ scores.[33] However, CTQ scores did not directly predict aggressive behavior. This may be due to the study's relatively small sample and the fact that our study was conducted with a healthy population. Although childhood trauma does not directly predict aggression in a healthy population, it may predict it indirectly through mediating factors such as psychoform and somatoform dissociative experiences.

The repression of sexuality and violence/aggression, the two strongest impulses according to the psychoanalytic approach, can lead to the conversion of these libidinal energies in the body. More recent explanations relate to the stress response in humans. It has been observed, for example, that individuals prone to aggression and hostility experience physical symptoms after prolonged sympathetic system activation.[37,38] The current study finds aggressive behavior to be most associated with somatoform dissociation; such dissociation increased self-reported aggressive behavior approximately threefold. Determining the somatic symptoms of aggression-a severe medical and public health issue-in adults with ADHD can facilitate clinical evaluation and treatment management.

Especially in adult samples, there is a lack of research on which ADHD symptom clusters relate to aggression.[39] In a study of children with ADHD who were followed to age 18, suicidal behavior was associated with hyperactivity/impulsivity and not with inattention.[40] In a recent study of 115 children, aggression was found to be more significantly correlated with hyperactivity/impulsivity than with inattention, and hyperactivity/impulsivity was a mediator between reactive aggression and suicidal behavior.[41] Similarly, in the current study, hyperactivity/impulsivity (and not inattention) predicted aggression in young adults at risk for ADHD.

One remarkable result of our study was that increased BMI in individuals at risk for ADHD predicted aggression, though BMI did not differ between the low- and high-risk ADHD groups. Previous studies with various participants have reported relationships between BMI and childhood behavior problems such as aggression.[42] Our findings suggest a bidirectional relationship between obesity and aggression and that this relationship is independent of ADHD.

One limitation of our study is its relatively small number of participants. Studies with larger numbers of healthy volunteers could test the hypothesis more clearly. In addition, all data were collected via self-report scales,

Table 3. Linear Regression Analysis for Predictors of Aggression in the ADHD High-Risk Group

	Unstandardized Coefficients		Standardized Coefficients	t	P	Collinearity	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-19.39	47.33		-0.41	.68		
Age	-0.30	2.44	-0.02	-0.12	.90	0.73	1.38
Cigarette use (unit/day)	0.13	0.61	0.03	0.21	.83	0.74	1.36
Alcohol use (unit/week)	1.88	3.06	0.10	0.61	0.54	0.51	1.96
Body Mass Index	1.35	0.47	0.34	2.85	**<0.01**	0.95	1.05
Inattention subscale of ASRS	-0.20	0.62	-0.04	-0.32	0.75	0.85	1.18
Hyperactivity/Impulsivity subscale of ASRS	1.61	0.58	0.36	2.75	**<0.01**	0.76	1.31
Childhood Trauma Questionnaire	-0.35	0.33	-0.15	-1.08	0.29	0.65	1.53
Dissociative Experiences Scale	-0.07	0.10	-0.12	-0.75	0.45	0.52	1.93
Somatoform Dissociation Questionnaire	0.93	0.29	0.45	3.20	**<0.01**	0.67	1.50

Note: Bold values denote statistical significance at the P < .05 level. ADHD: Attention Deficit Hyperactivity Disorder; ASRS: Adult ADHD Self-Report Scale.

which can include bias. Lack of controlling for participants' anxiety levels, obsessive-compulsive symptoms, symptoms of personality disorders, and subtypes of aggression was another limitation of the study. Finally, participants were not given psychiatric interviews and thus not formally diagnosed with ADHD; only the ADHD risk of participants was determined. Longitudinal studies with clinical samples could provide more comprehensive findings.

The most prominent finding of our study is that hyperactivity/impulsivity and somatoform dissociation strongly predict aggression in young adults at risk for ADHD. Identifying relating factors (such as impulsivity and somatoform dissociation) that trigger aggression in individuals with ADHD, who are known to be prone to childhood trauma and aggression, will broaden clinical perspectives for preventing and treating aggression. Somatoform dissociation may be a sign of repressed aggression converted in the body as a defense mechanism. Longitudinal studies of the clinical ADHD population are needed to elucidate and expand these findings.

Ethical Committee Approval: Ethical Committee Approval was received from the ethics committee of the Faculty of Medicine, Selçuk University (Decision Number: 2020/197; Date: May 13, 2020).

Conflict of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Informed consent was obtained in the study from the research participants.

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