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The relationship between childhood traumas, dissociation, and impulsivity in patients with borderline personality disorder comorbid with ADHD

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ABSTRACT

Objective: Previous studies reported that there were significant associations between Attention-deficit/hyperactivity disorder (ADHD) and borderline personality disorder (BPD). In this study, we aimed to examine complex relationship between childhood trauma, impulsivity, dissociative symptoms, and the impact of ADHD on this relationship in a sample of patients with BPD.

Methods: Our samples consisted of 165 BPD patients (128 female, 37 male) and 165 healthy subjects (128 female, 37 male) of similar age and gender. We administered the semi-structured socio-demographic data form, Adult Self-Report Scale, Barratt Impulsivity Scale (BIS-11), Childhood Trauma Questionnaire, and Dissociation Questionnaire.

Results: The BPD group exhibited greater ADHD symptoms, impulsivity, childhood trauma, and dissociation compared to the healthy group. A statistically significant association was found between adult ADHD symptoms and impulsivity, childhood trauma, and dissociation scores. The logistic regression analysis indicated that gender, attentional and motor impulsiveness were the predictors of ADHD in BPD patients. Among these, gender and emotional neglect were the predictors of dissociation in BPD patients.

Conclusion: Our results suggested a strong association between impulsivity, childhood trauma, dissociation, and ADHD symptoms in patients with BPD. The findings are mostly consistent with the literature. Clinicians should be aware of these symptoms among these populations to develop treatment strategies.

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Borderline personality disorder; adult attention-deficit hyperactivity disorder; impulsivity; childhood trauma; dissociation

Introduction

Borderline personality disorder (BPD) consists of pervasive affective instability, self-image disturbances, impulsivity, and unstable relationships [1]. The point prevalence of BPD is 1.6% and the lifetime prevalence is 5.9% and causes psychosocial impairment [2–4]. Attention-deficit/hyperactivity disorder (ADHD) is a disorder with symptoms of hyperactivity, impulsivity, and/or inattention. The symptoms affect cognitive, academic, behavioural, emotional, and social functioning [5]. ADHD is one of the most common neuropsychiatric disorders of childhood and adolescence, and often persists in adults. Many studies have reported that approximately 40–60% of patients go on to have significant ADHD-related problems in adulthood [6–9]. Epidemiologic studies of adult ADHD have estimated the current prevalence to be 4.4% in the U.S. and 3.4% globally [10].

Many studies have reported that a significant association between ADHD and BPD [11,12]. ADHD and BPD share common genetic, behavioural, and neuropsychological impairments such as poor self-regulation, inhibitory control, and executive function [13].

Impulsivity may characterize both ADHD and BPD. Affective lability is also a frequently associated feature of ADHD [14]. Retrospective studies report prevalence estimates of childhood ADHD in adult BPD patients ranging from 25.5% to 59.5% [15–19]. However, according to Ferrer et al. [20], BPD patients could be separated into two clear subgroups associated with the adult ADHD comorbidity because it has been observed that BPD-ADHD patients showed a homogeneous and impulsive profile [20].

There is evidence for a strong association between traumatic events and dissociative symptoms in BPD [21,22]. According to retrospective studies, borderline patients have high rates of childhood abuse [23,24] and dissociation [25]. Dissociation is defined as a disruption in the normal integration of consciousness, memory, perception, behaviour, and body representation. Dissociation can be a prominent feature in some individuals with BPD. Dissociation severity was predicted by childhood trauma such as inconsistent caretaking, sexual abuse, adult rape, and emotional neglect [26].

Since BPD is associated with childhood trauma and dissociation, ADHD is also associated with childhood

trauma [27]. There is a high degree of overlap between ADHD and post-traumatic stress disorder including inattention, impulsivity, inattention, and restlessness [28]. Re-experiencing trauma, hypervigilance, avoidance of stimuli may cause inattention which is the cardinal symptom of ADHD [28]. Like inattention, hyperactivity could be misdiagnosed as hyperarousal [29]. In a controlled study by Sar et al., 93.9% of the adolescents with dissociative disorder were found to have the comorbid psychiatric disorder and ADHD was the third common prevalent concurrent diagnosis [30].

In an epidemiological study, predominantly inattentive type of ADHD was found to be associated with physical neglect, physical abuse, sexual abuse, and predominantly hyperactive-impulsive type was found to be related to physical abuse [31]. According to a recent study, BPD-ADHD patients exhibited significantly higher scores in the total neglect scale [20]. However, Cengel-Kultur et al. [32] suggested that ADHD was the most common psychiatric comorbidity (22%) among the group of sexually, physically, and emotionally abused children. If the childhood trauma has been left unidentified, symptoms could become severe. For this reason, it is very important to identify trauma history for the diagnosis and treatment of BPD and ADHD patients.

Many studies reported that there were significant associations between ADHD and BPD [33]. However, childhood trauma history is also associated with both of these disorders, and dissociative symptoms are common in BPD patients and are related to childhood trauma history [34]. Therefore, it is very important to assess the complex relationships between ADHD and childhood traumas and dissociative symptoms in BPD patients. Impulsivity is also a core feature of ADHD and its associations with childhood trauma with BPD patients have not been studied yet. In this study, we aimed to determine the complex relationship between trauma, impulsivity, dissociative symptoms, and the impact of ADHD on this relationship in a sample of patients with BPD.

Material and methods

Study participants

This study was conducted in outpatients with BPD who were admitted to the Psychiatric Unit of Bagcilar Training and Research Hospital. Hundred and sixty-five outpatient (128 women, 37 men) with a mean age of 22.46 ± 5.04 who met Diagnostic and Statistical Manual of Mental Disorders – DSM-5 criteria for BPD, who were not under any medical treatment and did not have any comorbid psychiatric disorders, were enrolled to the study. The control group comprised 165 healthy controls (128 women, 37 men), with a mean age of 23.58 ± 5.59 . The exclusion criteria were illiteracy, cognitive impairment, mental

retardation, and comorbid psychiatric disorder. Hence, 34 participants were excluded from the study. The current study was approved by the Ethics Committee of our hospital, and all of the patients gave written informed consents before participation. Adult Self-Report Scale (ASRS-v1.1), Barratt Impulsivity Scale (BIS-11), Childhood Trauma Questionnaire (CTQ-28), and Dissociation Questionnaire (DIS-Q) were administered to the participants.

Psychometric measurements

Socio-demographic data form

This form included demographic variables including gender, age, marital status, education, employment status, and occupation.

Adult ADHD Self-Report Scale

ASRS is an 18-item scale that is developed by the World Health Organization [35] that measures the ADHD symptoms. It is a self-report scale, consists of two subscales that have nine items for attention-deficit and hyperactivity/impulsivity symptoms, respectively. The respondent is asked to rate how frequently each symptom has occurred in the last six months. Each item is rated from 0 (never) to 4 (very often). Its Turkish reliability and validity study has been conducted by Dogan et al. [36] and has been shown to be reliable and valid with high levels of internal consistency.

Barratt Impulsivity Scale-11

The BIS-11 is a 30-item self-report questionnaire to assess impulsiveness as a trait. It measures three subtypes of impulsivity: attention impulsivity, motor impulsivity, and non-planning impulsivity. High total scores of BIS-11 indicate a higher level of impulsiveness. Each item is rated from 1 (never) to 4 (very often, always). Each of three subtypes is combined with two factors: attention and cognitive instability are labelled as Attention impulsiveness, motor impulsiveness and perseverance are labelled as Motor impulsiveness, and self-control and cognitive complexity are labelled as Non-planning Impulsiveness [37]. Its Turkish reliability and validity have been examined by Gulec et al. [38].

Childhood Trauma Questionnaire

CTQ-28 [39] is a 28-item self-report consisting of the five subscales of trauma: physical neglect, emotional neglect, physical abuse, emotional abuse, and sexual abuse. This questionnaire asks the participant to respond on a 5-point Likert-type scale ranging from never true to often true. The questionnaire has shown good psychometric properties in four heterogeneous samples [40]. The reliability and the validity of the Turkish version of CTQ-28 have been demonstrated by Sar et al. [41].

Dissociation Questionnaire

DIS-Q is a 63-item self-report questionnaire that is developed by Vanderlinden et al. [42] and this scale is used in the assessment of dissociative experiences according to four subscales: “identity confusion,” “loss of control over behaviour, thoughts, and emotions,” “amnesia,” and “absorption.” Patients are asked to mark the most appropriate option for this condition. Each item is scored between 1 and 5 points; the mean score is obtained by dividing the total by 63 [43]. Its cut-off score is determined as 2.5 by Vanderlinden [42]. Its Turkish reliability and validity have been examined by Sar et al. [44].

Statistical analysis

All statistical analyses were performed using SPSS Version 23.0 for Windows. The variables in the present study were examined with the Kolmogorov–Smirnov’s test of normality. Because our data were not normally distributed, we used the Kruskal–Wallis-*H* test for comparisons and Spearman’s for correlations. A logistic regression analysis was performed to examine the association between ADHD in BPD patients and age, gender, the BIS subscales, and CTQ subscales. Moreover, a second logistic regression analysis was performed to examine the association between dissociation in BPD patients and age, gender, subscales of BIS, and subscales of CTQ. A *p* value less than .05 was considered statistically significant.

Results

Socio-demographic characteristics of sample

Socio-demographic characteristics of the patient group and the healthy controls are presented in Table 1. The average age was 22.46 ± 5.04 in the patient group and 23.58 ± 5.59 in the healthy control group. In both patient and healthy groups, 77.6% of participants were female and 22.4% were male. In the patient group, 32.1% of the participants were married, 61.8% of participants were single, 8 (4.8%) were divorced, and 2 participants (1.2%) were separated. In the healthy control group, 35.8% of the participants were married, 58.8% of participants were single, and 9 participants (5.5%) were divorced. There were no statistically significant differences between the patient group and the healthy controls in terms of gender, age, marital status, educational status, and employment ($p > .05$).

Comparison of impulsivity, hyperactivity, inattention, childhood trauma, and dissociation between patient and healthy groups

A Mann–Whitney *U* test was conducted to compare impulsivity, hyperactivity, childhood trauma, and

Table 1. Socio-demographic characteristics of the patient group and the control group.

		Healthy group (<i>n</i> = 165)		Patient group (<i>n</i> = 165)		<i>p</i>
Age		23.58 ± 5.59		22.46 ± 5.04		0.058
		<i>n</i>	%	<i>N</i>	%	<i>p</i>
Gender	Male	37	22.4	37	22.4	1.000
	Female	128	77.6	128	77.6	
Educational Status	Elementary School	20	12.1	23	13.9	0.105
	Middle School	39	23.6	48	29.1	
	High School	78	47.3	80	48.5	
	University	28	17.0	13	7.9	
	Other	0	0	1	0.6	
Marital status	Single	97	58.8	102	61.8	0.474
	Married	59	35.8	53	32.1	
	Divorced	9	5.5	8	4.8	
	Separated	0	0	2	1.2	
Employment	Unemployed	9	5.5	23	13.9	0.083
	Housewife	26	15.8	29	17.6	
	Civil servants	122	73.9	75	45.5	
	Student	7	4.2	31	18.8	
	Other	1	0.6	7	4.2	

dissociation between patient and healthy groups. The results revealed that total ASRS ($U = 3221.500$, $z = -11.995$, $p = .000$), Hyperactivity/Impulsivity ($U = 3637.000$, $z = -11.529$, $p = .000$), and Inattention ($U = 3687.000$, $z = -11.465$, $p = .000$) subscales of ASRS scores were significantly higher in the patient group. Similarly, total BIS scores ($U = 3748.000$, $z = -11.386$, $p = .000$) and the scores of second-order factors of BIS, Attentional Impulsiveness ($U = 5256.000$, $z = -9.664$, $p = .000$), Motor Impulsiveness ($U = 3518.000$, $z = -11.667$, $p = .000$), and Non-planning Impulsiveness ($U = 7139.000$, $z = -7.481$, $p = .000$), and also the scores of the first-order factors Attention ($U = 6234.000$, $z = -8.556$, $p = .000$), Cognitive instability ($U = 5870.000$, $z = -9.028$, $p = .000$), Motor ($U = 4032.000$, $z = -11.091$, $p = .000$), Perseverance ($U = 5273.000$, $z = -9.707$, $p = .000$), Self-control ($U = 7247.500$, $z = -7.370$, $p = .000$), and Cognitive complexity ($U = 7863.000$, $z = -6.668$, $p = .000$) were significantly higher in the patient group. Moreover, the CTQ total scores ($U = 4569.000$, $z = -10.460$, $p = .000$) and also Emotional Abuse ($U = 5440.500$, $z = -9.851$, $p = .000$), Physical Abuse ($U = 8.666.500$, $z = -6.332$, $p = .000$), Emotional Neglect ($U = 5008.500$, $z = -10.078$, $p = .000$), Physical Neglect ($U = 7266.500$, $z = -7.592$, $p = .000$) and Sexual Abuse ($U = 9201.000$, $z = -7.009$, $p = .000$) subscale scores were significantly higher in the patient group. In terms of Dissociation, our results revealed that Absorption ($U = 5100.000$, $z = -9.890$, $p = .000$), Confusion Fragmentation ($U = 4656.000$, $z = -10.344$, $p = .000$), Loss of Control ($U = 4276.000$, $z = -10.783$, $p = .000$), and Amnesia ($U = 5113.000$, $z = -9.822$, $p = .000$) and also the total scores of DIS-Q ($U = 4269.000$, $z = -10.787$, $p = .000$) subscale scores were significantly higher in the patient group. The results of the Mann–Whitney *U* test are presented in Table 2.

Table 2. Comparison of *impulsivity*, hyperactivity, inattention, childhood trauma, and dissociation between the patient group and the healthy group.

Scales and subscales	Group	Mean rank	<i>U</i>	<i>Z</i>	<i>p</i>
Total ASRS	Healthy	102.52	3221.500	-11.995	0.000
	Patient	228.48			
Hyperactivity/impulsivity	Healthy	105.04	3637.000	-11.529	0.000
	Patient	225.96			
Inattention	Healthy	105.35	3687.000	-11.465	0.000
	Patient	225.65			
Total BIS	Healthy	105.72	3748.000	-11.386	0.000
	Patient	225.28			
Attentional impulsiveness	Healthy	114.86	5256.000	-9.664	0.000
	Patient	216.14			
Attention	Healthy	120.78	6234.000	-8.556	0.000
	Patient	210.22			
Cognitive instability	Healthy	118.58	5870.000	-9.028	0.000
	Patient	212.42			
Motor impulsiveness	Healthy	104.32	3518.00	-11.667	0.000
	Patient	226.68			
Motor	Healthy	107.44	4032.000	-11.091	0.000
	Patient	223.56			
Perseverance	Healthy	114.96	5273.500	-9.707	0.000
	Patient	216.04			
Non-planning impulsiveness	Healthy	126.27	7139.000	-7.481	0.000
	Patient	204.73			
Self-control	Healthy	126.92	7247.500	-7.370	0.000
	Patient	204.08			
Cognitive complexity	Healthy	130.66	7863.500	-6.668	0.000
	Patient	200.34			
Total CTQ	Healthy	110.69	4569.000	-10.460	0.000
	Patient	220.31			
Emotional abuse	Healthy	115.97	5440.500	-9.851	0.000
	Patient	215.03			
Physical abuse	Healthy	135.52	8666.500	-6.332	0.000
	Patient	195.48			
Emotional neglect	Healthy	113.35	5008.000	-10.078	0.000
	Patient	217.65			
Physical neglect	Healthy	127.04	7266.500	-7.592	0.000
	Patient	203.96			
Sexual abuse	Healthy	138.76	9201.000	-7.009	0.000
	Patient	192.24			
Total DIS-Q	Healthy	108.87	4269.000	-10.787	0.000
	Patient	222.13			
Absorption	Healthy	113.91	5100.000	-9.890	0.000
	Patient	217.09			
Confusion fragmentation	Healthy	111.22	4656.500	-10.344	0.000
	Patient	219.78			
Loss of control	Healthy	108.92	4276.000	-10.783	0.000
	Patient	222.08			
Amnesia	Healthy	113.99	5113.000	-9.882	0.000
	Patient	217.01			

Notes: ASRS: Adult ADHD Self-Report Scale, BIS: The Barratt Impulsiveness Scale, CTQ: Childhood Trauma Questionnaire, DIS-Q: The Dissociation Questionnaire.

Correlation coefficients between ASRS scores and age, BIS-11, CTQ-28, and DIS-Q in the patient group

Inter-correlations between ASRS and Age, BIS-11, CTQ-28, and DIS-Q are presented in Table 3. Age was not found to be statistically significant with any subscale and also the total scores of ASRS ($p > .05$). The results of Spearman's correlation revealed that ASRS total scores were statistically significantly correlated with Attentional Impulsiveness ($r_s = 0.331$, $p < .001$), Motor Impulsiveness ($r_s = 0.472$, $p < .001$), Non-planning Impulsiveness ($r_s = 0.187$, $p < .05$), and also total BIS scores ($r_s = 0.432$, $p < .001$). Hyperactivity and Impulsivity subscale of ASRS were positively and significantly correlated with Attentional Impulsiveness ($r_s = 0.285$, $p < .001$), Motor Impulsiveness ($r_s = 0.482$,

$p < .001$), and Non-planning Impulsiveness ($r_s = 0.330$, $p < .001$) subscales of the BIS. Moreover, the Inattention subscale of ASRS was found to be statistically significantly correlated with Attentional Impulsiveness ($r_s = 0.324$, $p < .001$), Motor Impulsiveness ($r_s = 0.482$, $p < .001$), and Non-planning Impulsiveness ($r_s = 0.218$, $p < .001$).

When it comes to the relationship between ASRS scores and childhood trauma, the results of the study revealed that ASRS total scores were statistically significantly correlated with Emotional Abuse ($r_s = 0.268$, $p < .001$), Emotional Neglect ($r_s = 0.214$, $p < .01$), Physical Neglect ($r_s = 0.201$, $p < .01$) subscales of CTQ, and also total scores of CTQ ($r_s = 0.212$, $p < .001$). Hyperactivity and Impulsivity subscales of ASRS were positively and significantly correlated with Emotional

Table 3. Correlation coefficients between ASRS scores and Age, BIS-11, CTQ-28, and DIS-Q in the patient group.

	Age	Total ASRS	Hyperactivity/impulsivity	Inattention
Age	1.000	−0.002	−0.034	0.015
Total BIS	0.005	0.432**	0.330**	0.443**
Attentional impulsiveness	−0.041	0.331**	0.285**	0.324**
Motor impulsiveness	0.014	0.472**	0.372**	0.482**
Non-planning impulsiveness	0.016	0.187*	0.095	0.218**
Total CTQ	0.176*	0.212**	0.145	0.234**
Emotional abuse	0.074	0.268**	0.220**	0.261**
Physical abuse	0.193*	0.214**	0.164*	0.222**
Emotional neglect	0.118	0.082	0.053	0.097
Physical neglect	0.197*	0.201**	0.121	0.265**
Sexual abuse	0.149	0.101	0.084	0.103
Total DIS-Q	0.106	0.413**	0.341**	0.370**
Absorption	0.100	0.379**	0.307**	0.343**
Confusion fragmentation	0.133	0.378**	0.381**	0.286**
Loss of control	0.064	0.340**	0.267**	0.311**
Amnesia	0.083	0.463**	0.374**	0.445**

Notes: ASRS: Adult ADHD Self-Report Scale, BIS: The Barratt Impulsiveness Scale, CTQ: Childhood Trauma Questionnaire, DIS-Q: The Dissociation Questionnaire.

*Correlation is significant at the 0.05 level (two-tailed).

**Correlation is significant at the 0.01 level (two-tailed).

Abuse ($r_s = 0.220$, $p < .01$) and Physical Abuse ($r_s = 0.164$, $p < .05$) subscales of CTQ. Moreover, the Inattention subscale of ASRS was found to be statistically significantly correlated with Emotional Abuse ($r_s = 0.261$, $p < .01$), Physical Abuse ($r_s = 0.222$, $p < .01$), Physical Neglect ($r_s = 0.265$, $p < .01$) subscales of CTQ, and also the total scores of CTQ ($r_s = 0.234$, $p < .01$).

ASRS scores were also statistically significantly correlated with dissociation. Total ASRS scores were positively and significantly correlated with Absorption ($r_s = 0.379$, $p < .001$), Confusion Fragmentation ($r_s = 0.378$, $p < .001$), Loss of Control ($r_s = 0.340$, $p < .001$), and Amnesia ($r_s = 0.463$, $p < .001$) subscales and also DIS-Q total scores ($r_s = 0.413$, $p < .001$). Hyperactivity and Impulsivity subscales of ASRS were positively and significantly correlated with Absorption ($r_s = 0.307$, $p < .001$), Confusion Fragmentation ($r_s = 0.381$, $p < .001$), Loss of Control ($r_s = 0.267$, $p < .001$), and Amnesia ($r_s = 0.374$, $p < .001$) subscales, and also DIS-Q total scores ($r_s = 0.341$, $p < .001$). Moreover, the Inattention subscale of ASRS was found to be statistically significantly correlated with Absorption ($r_s = 0.343$, $p < .001$), Confusion Fragmentation ($r_s = 0.286$, $p < .001$), Loss of Control ($r_s = 0.311$, $p < .001$), and Amnesia ($r_s = 0.445$, $p < .001$) subscales, and also DIS-Q total scores ($r_s = 0.370$, $p < .001$).

Comparison of CTQ and DIS-Q scores in terms of gender

A Mann–Whitney U test was conducted to compare CTQ and DIS-Q scores between male and female BPD patients. The results are presented in Table 4. According to the results, Emotional Abuse ($U = 909.500$, $z = -5.739$, $p = .000$), Physical Abuse ($U = 1396.000$, $z = -3.954$, $p = .000$), Emotional Neglect ($U = 687.000$, $z = -6.584$, $p = .000$), Physical Neglect ($U = 1114.500$, $z = -4.944$, $p = .000$), and Sexual Abuse ($U = 1503.500$, $z = -3.884$, $p = .000$) subscale

scores of CTQ, and also total CTQ scores ($U = 563.000$, $z = -7.055$, $p = .000$) were statistically significantly higher in female BPD patients compared to male BPD patients.

Similarly, the Mann–Whitney U test revealed that Absorption ($U = 572.000$, $z = -7.036$, $p = .000$), Confusion Fragmentation ($U = 510.000$, $z = -7.260$, $p = .000$), Loss of Control ($U = 347.500$, $z = -7.897$, $p = .000$), Amnesia ($U = 709.500$, $z = -7.660$, $p = .000$) subscale scores of DIS-Q, and also total DIS-Q ($U = 407.500$, $z = -7.660$, $p = .000$) scores were statistically significantly higher in female BPD patients compared to male BPD patients.

The predictors of ADHD in BPD patients

A logistic regression analysis was conducted to predict comorbidity of ADHD in patients with BPD for 165

Table 4. Comparison of CTQ and DIS-Q scores in terms of gender.

Scale	Group	Mean rank	U	Z	p
Total CTQ	Female	97.10	563.000	−7.055	0.000
	Male	34.22			
Emotional abuse	Female	94.39	909.500	−5.739	0.000
	Male	43.58			
Physical abuse	Female	90.59	1396.000	−3.954	0.000
	Male	56.73			
Emotional neglect	Female	96.13	687.000	−6.584	0.000
	Male	37.57			
Physical neglect	Female	92.79	1114.500	−4.944	0.000
	Male	49.12			
Sexual abuse	Female	89.75	1503.500	−3.884	0.000
	Male	59.64			
Total DIS-Q	Female	98.32	407.500	−7.660	0.000
	Male	30.01			
Absorption	Female	97.03	572.000	−7.036	0.000
	Male	34.46			
Confusion fragmentation	Female	97.52	510.000	−7.260	0.000
	Male	32.78			
Loss of control	Female	98.79	347.500	−7.897	0.000
	Male	28.39			
Amnesia	Female	95.96	709.500	−6.483	0.000
	Male	38.18			

Notes: CTQ: Childhood Trauma Questionnaire, DIS-Q: The Dissociation Questionnaire.

Table 5. Logistic regression analysis of ADHD comorbidity.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age	0.014	0.039	0.132	1	0.716	1.014	0.939	1.096
Gender	1.544	0.609	6.422	1	0.011	4.683	1.419	15.458
Attentional impulsiveness	0.115	0.050	5.342	1	0.021	1.122	1.018	1.236
Motor impulsiveness	0.114	0.038	9.161	1	0.002	1.121	1.041	1.207
Non-planning impulsiveness	0.023	0.033	0.481	1	0.488	1.023	0.959	1.092
Emotional abuse	0.058	0.066	0.763	1	0.382	1.059	0.931	1.206
Physical abuse	0.074	0.077	0.911	1	0.340	1.077	0.925	1.252
Emotional neglect	−0.026	0.059	0.197	1	0.657	0.974	0.867	1.094
Physical neglect	0.042	0.060	0.500	1	0.479	1.043	0.928	1.173
Sexual abuse	0.017	0.051	0.113	1	0.737	1.017	0.921	1.123
Constant	−8.437	2.013	17.561	1	0.000	0.000		

Notes: Model $\chi^2 = 38.889$, $p < .001$. Nagelkerke's $R^2 = 0.287$. $n = 165$.

ADHD: Attention Deficit Hyperactivity Disorder.

Bold values indicates $p < 0.05$.

patients using age, gender, BIS subscales, and CTQ subscales as predictors. A test of the full model against a constant-only model was statistically significant, indicating that the predictors as a set reliably distinguished between BPD patients with ADHD and BPD patients who have no comorbid ADHD (chi-square = 38.889, $p < .001$ with $df = 10$).

Nagelkerke's R^2 of 0.287 indicated a modest relationship between prediction and grouping. Prediction success overall was 77% (87.6% for ADHD comorbidity and 58.3% for absent comorbidity of ADHD). The Wald criterion demonstrated that gender ($p = .011$), Attentional Impulsiveness ($p = .021$) and Motor Impulsiveness ($p = .002$) made a significant contribution to prediction. None of the other subscales of the BIS and none of CTQ subscale scores were a significant predictor of ADHD comorbidity. The results are presented in Table 5.

The predictors of dissociation in BPD patients

A logistic regression analysis was conducted to predict the presence of dissociation in patients with BPD for 165 patients using age, gender, subscales of BIS, and subscales of CTQ as predictors. A test of the full model against a constant-only model was statistically significant, indicating that the predictors as a set reliably distinguished between BPD patients with

dissociation and without dissociation (chi-square = 83.682, $p < .001$ with $df = 10$).

Nagelkerke's R^2 of 0.530 indicated a moderate relationship between prediction and grouping. Prediction success overall was 80% (76.2% for patients without dissociation and 84.0 for patients with dissociation). The Wald criterion demonstrated that gender ($p = .004$) and emotional neglect ($p = .031$) made a significant contribution to prediction. None of other subscales of the BIS and none of CTQ subscale scores were a significant predictor of the presence of dissociation in BPD patients. The results are presented in Table 6.

Discussion

The aim of this study was to examine the impact of childhood traumas, dissociative symptoms, and impulsivity on the relationship between BPD and adult ADHD symptoms.

Our results revealed that there was a strong relationship between BPD and ADHD. BPD patients had higher scores from ASRS-v1.1 compared to healthy participants. The relationship between BPD and ADHD has been examined in many studies, and the results are mostly consistent. There are also studies which indicate that BPD and ADHD share common aetiological factors and clinical features [45]. Previous

Table 6. Logistic regression analysis of the presence of dissociation.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age	0.039	0.041	0.899	1	0.343	1.039	0.960	1.126
Gender	−3.290	1.150	8.182	1	0.004	0.037	0.004	0.355
Attentional impulsiveness	0.104	0.060	3.041	1	0.081	1.110	0.987	1.248
Motor impulsiveness	0.039	0.041	0.899	1	0.343	1.040	0.959	1.127
Non-planning impulsiveness	0.016	0.036	0.182	1	0.670	1.016	0.946	1.091
Emotional abuse	0.052	0.071	0.539	1	0.463	1.053	0.917	1.209
Physical abuse	0.099	0.083	1.431	1	0.232	1.104	0.939	1.298
Emotional neglect	0.131	0.061	4.647	1	0.031	1.140	1.012	1.285
Physical neglect	0.006	0.060	0.009	1	0.924	1.006	0.894	1.131
Sexual abuse	−0.031	0.051	0.381	1	0.537	0.969	0.878	1.070
Constant	−3.126	2.137	2.141	1	0.143	0.044		

Notes: Model $\chi^2 = 83.682$, $p < .001$. Nagelkerke's $R^2 = 0.530$. $n = 165$.

Bold values indicates $p < 0.05$.

studies suggested that self-harm, impulsivity, and emotional dysregulation were predictive of BPD in adulthood and impulsivity is regarded as a core feature of both BPD [1] and ADHD [46]. According to Fossati et al., 60% of adults with BPD meet criteria for childhood ADHD [11]. Philipsen et al. suggested that ADHD symptoms in childhood were found to be a potentially aggravating factor in BPD [12]. Moreover, the comorbidity of two disorders has been associated with high severity and a more impulsive subgroup of BPD [47]. Since ADHD predicts the severity of BPD, clinicians must carefully evaluate the treatment strategies for both disorders. However, the other variables that affect this relationship such as childhood maltreatment and trauma should be considered.

In the present study, childhood traumas were more common in the past history of patients with BPD. Similar to the results of our study, some studies in the literature indicated that childhood abuse – especially sexual abuse – was common among borderline patients [24,48,49]. Moreover, according to Zanarini et al. [50], the severity and psychosocial impairment of BPD patients have been influenced by the severity of childhood sexual and other forms of abuse and neglect in childhood. These results and our results suggested that childhood trauma – in specific, sexual abuse – may be a critical factor in the aetiology of BPD.

In this study, the borderline group exhibited greater dissociation compared to the healthy group. Dissociation comprises one of the nine criteria of Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-5) [5] criteria for the BPD: transient, stress-related paranoid ideation or severe dissociative symptoms. Dissociation is a prominent feature in some individuals with BPD. Similarly, according to Zanarini et al., dissociation was examined out of 290 BPD patients, and it was reported that 32% had low, 42% had moderate, and 26% had high levels of dissociation [26]. The developmental components of dissociations have not been understood well and have been compellingly linked to trauma in many studies [51]. The severity of dissociation was predicted by various types of trauma such as sexual abuse, neglect by the caretaker [52]. According to Simeon et al., dissociation was associated with childhood emotional neglect and total childhood trauma in BPD patients [34]. For this reason, the childhood trauma history in BPD patients may play a significant role in the aetiology of dissociation in BPD patients and clinicians should always consider this situation.

In the present study, age was not found to be statistically significant with any subscale and the total scores of ASRS. This result may be interpreted as ADHD symptoms in BPD patients which may not decrease or increase depending on age. However, a recent study has reported that the presentation of ADHD symptoms may change with more attention problems,

emotional dysregulation, irritability, mood swings, temper outbursts but less hyperactivity and impulsivity from adolescence to adulthood [46]. The effect of ageing on ADHD symptoms in BPD patients has been examined in very few studies, and the results of existing studies are incompatible. Therefore, this gap in the literature makes it difficult for us to make a conclusion about how age affects ADHD symptoms in BPD patients. Further longitudinal studies and follow-up studies are crucial to a better understanding of this relationship. According to our results, ASRS scores were correlated with impulsivity scores. As it is known, impulsivity is a common phenomenon in BPD and ADHD. A recent study reported that there was a significant association between impulsivity and symptoms of ADHD in female BPD patients [53]. In terms of the relationship between BPD, ADHD, and impulsivity, BPD-ADHD has been considered a severe, more impulsive and homogeneous subtype of BPD [12,20]. Our results indicated that ASRS total scores were significantly correlated with emotional abuse, emotional neglect, and physical neglect. Hyperactivity/Impulsivity subscale of ASRS was found to be positively and significantly correlated with emotional abuse and physical abuse. The inattention subscale of ASRS was found to be statistically significantly correlated with emotional abuse, physical abuse, and physical neglect. Similar to our study, according to Ferrer et al. [54], sexual abuse and emotional abuse were higher in the BPD-ADHD group compared to the no BPD-no ADHD group. Furthermore, physical and emotional neglect were reported as the most frequent maltreatment when BPD-ADHD was compared with BPD. In a recent study, emotional abuse and neglect were common among men and women with ADHD when compared to controls, and physical neglect and sexual abuse were more common among female patients with ADHD [27]. In this study, the data supported that there was a high correlation between ASRS scores and dissociation scores. In BPD, there is a strong association between traumatic events and dissociative symptoms [21]. Moreover, a possible relationship has been suggested between ADHD and dissociation [55]. According to a recent study, ADHD symptoms and dissociative symptoms may coexist and overlap in abused children [56]. These findings may suggest that a history of childhood trauma and ADHD symptoms might be a precursor to dissociation as the ADHD symptoms can lead to BPD in adulthood.

When we compared the childhood trauma and dissociation scores in terms of gender, history of any childhood trauma and dissociative symptoms were found to be higher in female patients. This finding is consistent with the literature. As in previous studies, history of any abuse was found to be higher in girls with BPD than in controls [57]. Childhood abuse and

childhood sexual abuse have been hypothesized as aetiological components of BPD, most notably in women [24,58]. Zanarini et al. found that female patients diagnosed with BPD reported a higher incidence of adult physical and sexual abuse than male BPD patients did [59].

In the logistic regression analysis, gender, attentional impulsiveness and motor impulsiveness were predictive of ADHD in BPD patients. This finding may support that impulsivity plays a role as a predictor of BPD criteria and unique mediator of the relationship between childhood ADHD and adult BPD in female patients [60]. Many studies support this finding in BPD patients. Williams et al. [61] suggested that BPD patients had higher scores on motor impulsiveness and Speranza et al. [62] reported a significant relationship between attentional/cognitive impulsivity and BPD. However, as gender plays a role as predictor in this relationship and ADHD is more common in males [6], ADHD comorbidity in BPD especially in female patients should always be considered for the treatment strategies.

In the present study, according to logistic regression analysis, gender and emotional neglect were predictive of dissociation in BPD patients. Previous studies demonstrated that children who were sexually abused reported dissociative symptoms and developed attention problems [63]. According to our study, it is demonstrated that sexual abuse in childhood is not predictive of dissociation, but it is important to report due to the fact that emotional neglect in childhood may also lead to attention and dissociative symptoms. However, Simeon et al. reported that dissociation in BPD was not significantly related to total childhood trauma but was intimately tied to only emotional neglect [34]. Since the relationship between childhood trauma and dissociation plays a role in BPD patients, further studies involving large numbers of patients are required.

Our study has certain limitations. First, the study has a small sample size. All the scales used in the present study were self-rated. Since our study is a cross-sectional study, it cannot make inferences about the relationship and inter-relatedness among BPD, ADHD, trauma, and dissociation.

In conclusion, our study revealed that BPD had a significant relationship between ADHD, dissociation, impulsivity, and childhood trauma history. Clinicians must carefully evaluate ADHD symptoms in addition to history of childhood trauma and dissociative symptoms among this population. This may help clinicians to develop appropriate therapeutic strategies for these patients.

Disclosure statement

No potential conflict of interest was reported by the authors.

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