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## The relationship between impulsivity and attention-deficit/hyperactivity symptoms in female patients with borderline personality disorder

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#### ABSTRACT

**OBJECTIVES:** In this present study, we aimed to examine the relationship between impulsivity and attention-deficit/hyperactivity symptoms in female patients with borderline personality disorder (BPD) and compare these symptoms with a healthy group.

**METHODS:** The sample of this study was composed of randomly selected 90 female patients diagnosed with BPD according to Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (DSM-5) criteria and not receiving any medical treatment during the past six months since presented to the Bagcilar Training and Research Hospital and randomly selected 90 healthy controls who were free of any psychiatric disorders. Semi-structured sociodemographic data form, Adult ADHD Self-Report Scale (ASRS-v1.1), and Barratt Impulsiveness Scale (BIS-11) were administered.

**RESULTS:** Total BIS scores were statistically significantly correlated with total ASRS (r = .557, p < .001) and its two subscales: Inattention (r = .593, p < .001) and Hyperactivity/Impulsivity (r = .399, p < .001). The results of Chi-square test revealed a statistically significant difference in terms of being diagnosed with attention-deficit/hyperactivity disorder (ADHD) or not between patient and healthy group ( $\chi^2 = 46.667$ , df = 1, p = .000). Furthermore, there was a statistically significant difference between the patients and the healthy controls in terms of total BIS-11 [t(178) = 10.444, p = .000] and total ASRS [t(178) = 9.697, p = .000]. The results of hierarchical multiple regression revealed that Motor subscale scores were significantly predictive of ASRS scores [ $R^2 = .337$ , F(6,82) = 5.960, p = .00].

**CONCLUSIONS:** In this present study, patients with BPD had higher rates of comorbid ADHD and impulsivity scores than healthy controls. ASRS scores and BIS scores were positively correlated, and motor subscale scores were significantly predictive of ASRS scores.

#### Introduction

Borderline personality disorder (BPD) is characterized by a pervasive pattern of instability in impulse control, affect regulation, self-image, and intense interpersonal relationships [1]. The clinical studies revealed that the life-long prevalence of BPD was 5.9% and point prevalence was 1.4% [2,3]. Based on these studies, specific features of BPD, which starts in the adolescence period like self-harm, impulsivity, emotional lability, recurrent suicidal behaviour, gestures, and threats are the predictive features [2,3]. Impulsivity is one of the core factors contributing to the severity of the disorder and the clinical course is strongly related to the impulsivity in the areas such as substance use disorder, impulsive spending/gambling, reckless driving, physical assaults, promiscuity, and binge eating/purging [4,5]. BPD occurs in 10% of the all psychiatric patients and it was reported that 90% of the BPD patients have one and 40% of them have two psychiatric comorbidities [6].

Attention-deficit/hyperactivity disorder (ADHD) is one of the common neurobehavioural disorders, ARTICLE HISTORY

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#### **KEYWORDS**

Borderline personality disorder; attention-deficit/ hyperactivity disorder; impulsivity

which starts in early childhood and adolescence period. However, two-thirds of these patients have persisting symptoms continuing to adulthood [7]. Adult ADHD is related to many problems in interpersonal, academic, and social life [8]. The prevalence of the adult ADHD was reported as 4.4% in epidemiologic studies [7-9]. Adult ADHD is characterized by attention deficit, impulsivity, and irritability, which cause many dysfunctions. Affective lability is a very common symptom for these patients [7]. Impulsivity is also a central feature of ADHD. Clinical symptom of impulsivity in ADHD patients has many forms such as motor impulsivity (hyperactivity), cognitive impulsivity (poor cognitive control), emotional impulsivity (affective dysregulation), and impulsivity in the interpersonal relationships/social disinhibition [10].

According to Fossati et al., 60% of adults with BPD retrospectively meet criteria for childhood ADHD [11]. The two disorders share similar features including poor self-regulation, reduced inhibitory control, and impaired executive functions [12]. Impulsivity is

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considered as a central feature of both BPD and ADHD [12]. According to Davids and Gastpar, the symptoms of BPD are very heterogeneous; some of them have impulsivity features, others have affective and dissociative features prominently [13]. There is evidence to suggest that childhood ADHD might be a risk factor for BPD with respect to impulsivity features due to a documented relationship between childhood history of ADHD and BPD in adulthood [14]. Nonetheless, impulsivity is a multidimensional construct composed of motor, attentional, and cognitive factors [15].

Although many studies reported that there was an association between ADHD and BPD, the nature of this relation has not been completely understood. No studies have examined the association of impulsivity as a part of the adult ADHD symptomatology in patients with BPD or which type of impulsivity was related to BPD and adult ADHD. In this study, we aimed to examine the prevalence of ADHD symptoms in patients with BPD and to determine the type of impulsivity that is observed in patients with BPD with or without ADHD symptoms.

#### **Methods**

#### **Study participants**

This study was conducted in outpatients with BPD who presented to the Psychiatric Unit of Bagcilar Training and Research Hospital. The sample was composed of 90 outpatients (90 women) with a mean age of 23.29 years (SD  $\pm$  5.77) (range: 18-46) who met Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5) [16] criteria for BPD. The control group composed of 90 healthy controls (90 women), with a mean age of 25.33 years  $(SD \pm 6.35)$  (range: 18-40). Both study groups were free of any medical treatment and also healthy group was free of any psychiatric/neurological disorders. Inclusion criteria for BPD group were being at least 18 years of age and meeting DSM-5 criteria for BPD. Exclusion criteria were: an IQ less than 75, diagnosis of schizophrenia, schizoaffective disorder, schizophreniform disorder, delusional disorder, dementia or organic mental disorder, bipolar disorder, an educational level lower than elementary school, and incomplete participation to the study. According to these criteria, 23 BPD patients were excluded from the study. The current study was approved by the Ethics Committee of Bagcilar Training and Research Hospital, and all of the patients gave written informed consents before participation. Following the study has been thoroughly explained them, Adult Self-Report Scale (ASRS-v1.1) and Barratt Impulsiveness Scale (BIS-11) were administered to the participants.

#### **Psychometric measurements**

#### Sociodemographic data form

This form includes demographic variables, including age, marital status, occupational status, and education.

#### Adult ADHD Self-Report Scale (ASRS-v1.1)

ADHD symptoms were measured with the ASRS that is an 18-item scale that is developed by the World Health Organization [17]. It is a self-report scale, consists of two subscales that have nine items for attention deficit and hyperactivity/impulsivity symptoms, respectively. The reliability and validity study of Turkish form has been conducted by Dogan et al. [18] and has been shown to be reliable and valid with high levels of internal consistency. The respondent is asked to rate how frequently each symptom has occurred during the past six months. Each item is rated from 0 (never) to 4 (very often).

#### The Barratt Impulsiveness Scale (BIS)

It is a self-report questionnaire that measures different dimensions of impulsivity. Since its first presentation in 1959 [19], this scale has undergone several modifications. The current version (BIS-11) is one of the most often used tools to assess impulsivity, presenting impressive evidence concerning its validity, reliability, and predictive value [20]. Briefly, BIS-11 is composed of 30 items scored on a Likert scale (ranging from never = 1 point to very frequently = 4 points). It assesses the three main dimensions of impulsive behaviour: attentional (a lack of focus on the ongoing task), motor (acting without thinking), and non-planning impulsivity (orientation to the present rather than to the future). According to Patton et al. [21], the scale also assesses six first-order factors (attention, cognitive instability, motor, perseverance, self-control, and cognitive complexity); however, most studies reporting BIS-11 scores have focused on the three second-order factors [20]. BIS-11 is reliable (high internal consistency and test/retest stability) and valid, and it has been able to draw associations between inattention and hyperactivity symptoms and smoking habits as well as between psychiatric disorders. The Brazilian version of BIS-11 presented a two-factor structure (inhibition control and non-planning), rather than the original three-factor structure [22]. BIS-11 has been adapted into Turkish, and the reliability and validity have been examined by Güleç et al. [23].

#### Statistical analysis

Prior to data analysis, the data were checked for normality using analytical (Kolmogorov–Smirnov/Shapiro–Wilk's tests) and visual methods (histograms and probability plots). All of the variables were found to be normally distributed. Therefore, in our statistical analyses, parametric tests were used. An independentsample *t*-test was used to compare the ordinal data between the independent groups, and the categorical variables were compared with a Chi-square and Fisher's exact test. Hierarchical regression analyses were used to examine the significant predictors of Adult ADHD Self-Report Scale scores. To reduce the risks of false positives in the correlation analyses, a significance level of p < .01 was implemented. For the remaining analyses, statistical significance was established at p< .05. The statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 23 for Windows (SPSS, Inc., Chicago, IL, U.S.A.).

#### Results

#### Sociodemographic characteristics of sample

Sociodemographic characteristics of the patient group and the healthy controls were presented in Table 1. The average age was  $23.29 \pm 5.77$  in the patient group and  $25.33 \pm 6.35$  in the healthy control group. Approximately half of the participants in the healthy control group and the patient group were single (46.67% and 62.22%, respectively) and the other half were married (45.56% and 30.00%, respectively) participants. The remaining participants (7.78%) in the healthy group and five (5.56%) participants in the patient group were divorced. There were no statistically significant differences between the patient group and the healthy controls in terms of age, educational status, employment, and marital status.

### Correlations of age, impulsivity, and ADHD scores in the patient group

Inter-correlations between the ASRS scores, the BIS scores, and age were presented in Table 2. Age was

 
 Table 1. Sociodemographic characteristics of the patient group and the control group.

		Healthy group ( <i>n</i> = 90)		Patient group (n = 90)		р
		25.33	$25.33 \pm 6.35$		23.29 ± 5.77	
Age		n	%	n	%	
Educational status	Elementary School	13	14.40	19	21.11	.924
	Middle school	23	25.56	23	25.56	
	High School	31	34.44	41	45.56	
	University	23	25.60	7	7.78	
Employment	Unemployed	3	3.30	10	1.11	.861
	Housewife	20	22.20	20	20.00	
	Civil servant workers	63	70.00	30	25.56	
	Student	3	3.30	23	45.56	
	Other	1	1.10	7	7.78	.065
Marital status	Single	42	46.67	56	62.22	
	Married	41	45.56	27	30.00	
	Divorced	7	7.78	5	5.56	
	Separated	0	0.00	2	2.22	

Table 2.	Correlations	of age,	impulsivity,	and	ADHD	in լ	patient
group.							

	Age	Total ASRS	Hyperactivity/ Impulsivity	Inattention
Age		049	017	.071
Total BIS	.003	.557**	.399**	.593**
Attentional impulsiveness	.007	.458**	.395**	.419**
Attention	.028	.394**	.317**	.384**
Cognitive instability	024	.340**	.323**	.280**
Motor impulsiveness	005	.515**	.373**	.543**
Motor	.011	.473**	.370**	.472**
Perseverance	024	.273**	.160	.328**
Non-planning impulsiveness	.006	.413**	.240*	.497**
Self-control	.040	.416**	.276**	.464**
Cognitive complexity	034	.265*	.115	.360**

Notes: ADHD, attention-deficit hyperactivity disorder; BIS, The Barratt Impulsiveness Scale.

\*\*Correlation is significant at the .01 level (2-tailed).

\*Correlation is significant at the .05 level (2-tailed).

not found to be statistically significant with any of the scale scores (p > .05).

Total BIS scores were statistically significantly correlated with total ASRS (r = .557, p < .001) and its two subscales, namely Inattention (r = .593, p < .001) and Hyperactivity/Impulsivity (r = .399, p < .001).

Correlation coefficients between the scores of the subscales of the BIS and the scores of the subscales of the ASRS were also statistically significant. Scores of Attentional Impulsiveness subscale of BIS were found to be statistically significantly correlated with total ASRS scores (r = .458, p < .001), Inattention (r = .419, p < .001), and Hyperactivity/Impulsivity (r = .395, p < .001). There were also statistically significant correlations between motor impulsiveness scores and total ASRS scores (r = .515, p < .001), Inattention scores (r = .543, p < .001), and Hyperactivity/Impulsivity scores (r = .373, p < .001). Inter-correlations between Non-planning Impulsiveness scores and total ASRS scores (r = .413, p < .001), Inattention scores (r = .497, Hyperactivity/Impulsivity p < .001),and scores (r = .240, p < .05) were also found to be positive and statistically significant.

## Comparison of ADHD diagnosis between the patient and healthy controls

Table 3 displays the frequencies and percentage scores on ADHD diagnosis among healthy and patient groups. In the study sample, there were totally 54 (30%) participants who had been diagnosed with ADHD. ADHD diagnosis was found in only 6 (6.7%) of the 90 participants in the healthy group, while ADHD was found in 53.3% of the participants in the patient group. The results of Chi-square test revealed a statistically significant difference in terms of being diagnosed with ADHD or not between patient and healthy group ( $\chi 2 = 46.667$ , df = 1, *p* = .000).

Table 3. Summary of the crosstab analysis for healthy controls and patients.

ADHD diagnosis	Healthy controls	Patients	Total	χ <sup>2</sup>	Fisher's exact test
Absent	93.3% (84)	46.7% (42)	70% (126)	46.667	0.00
Present	6.7% (6)	53.3% (48)	30% (54)		

Notes: Frequencies are shown in parentheses. ADHD, attention-deficit hyperactivity disorder.

#### Comparison of impulsivity and attention-deficit/ hyperactivity in patients and healthy controls

An independent-sample *t*-test was performed to compare all subscales of the BIS-11 and the ASRS-v1.1 and subscales for BPD patients and healthy controls. The results revealed that there were statistically significant differences between the patients and healthy controls in terms of BIS-11 total [t(178) = 10.444, p = .000] and ASRS total [t(178) = 9.697, p = .000]. The total BIS scores ( $\bar{X}_{\text{patient}} = 75.18$ , SD<sub>Patient</sub> = 12.542;  $\bar{X}_{\text{Healthy}} = 57.37$ , SD<sub>Healthy</sub> = 10.222) were significantly higher in BPD patients compared to the healthy controls. Similarly, the total ASRS scores ( $\bar{X}_{\text{patient}} = 38.76$ , SD<sub>Patient</sub> = 11.468;  $\bar{X}_{\text{Healthy}} = 23.39$ , SD<sub>Healthy</sub> = 9.720) were significantly higher in BPD patients compared to the healthy controls.

There were also statistically significant differences between the patients and healthy controls in terms of the three second-order factors of BIS. More specifically, Attentional Impulsiveness [t(178) = 7.303, p = .000], Motor Impulsiveness [t(178) = 8.472, p = .000], and Non-planning Impulsiveness [t(178) = 9.326, p = .000] scores were significantly higher in BPD patients compared to the healthy controls.

Furthermore, there were statistically significant differences between the patients and healthy controls in terms of Inattention [t(178) = 8.814, p = .000] and Hyperactivity/Impulsivity [t(178) = 8.625, p = .000] and subscales of the ASRS. The Inattention ( $\bar{X}_{\text{patient}} = 20.08$ , SD<sub>Patient</sub> = 6.348;  $\bar{X}_{\text{Healthy}} = 12.18$ , SD<sub>Healthy</sub> =

Table 4.Impulsivity and attention-deficit/hyperactivity inpatients and healthy controls.

			Hea	althy		
	Pat	ients	Cor	ntrols		
	(n =	= 90)	(n =	= 90)		
Scale	М	SD	М	SD	<i>t</i> (df = 178)	р
Total ASRS	38.76	11.468	23.39	9.720	9.697	.000
Hyperactivity/	18.68	6.579	11.21	4.916	8.625	.000
Impulsivity						
Inattention	20.08	6.348	12.18	5.658	8.814	.000
Total BIS	75.18	12.542	57.37	10.222	10.444	.000
Attentional	19.66	3.998	15.18	4.226	7.303	.000
Impulsiveness						
Attention	12.38	2.815	9.59	2.929	6.512	.000
Cognitive instability	7.28	2.120	5.59	1.841	5.706	.000
Motor impulsiveness	24.70	5.805	18.60	3.600	8.472	.000
Motor	16.47	4.495	12.14	2.713	7.810	.000
Perseverance	8.23	3.145	6.46	1.921	4.577	.000
Non-planning	30.82	5.263	23.59	5.143	9.326	.000
Impulsiveness						
Self-control	16.57	3.366	12.27	3.556	8.331	.000
Cognitive	14.26	2.921	11.32	2.689	7.009	.000
complexity						

Notes: ASRS, Adult ADHD Self-Report Scale; BIS, The Barratt Impulsiveness Scale.

5.658) and Hyperactivity/Impulsivity ( $\bar{X}_{patient} = 18.68$ , SD<sub>Patient</sub> = 6.579;  $\bar{X}_{Healthy} = 11.21$ , SD<sub>Healthy</sub> = 4.916) subscale scores were significantly higher in BPD patients compared to the healthy controls. The results of the independent-sample *t*-test were presented in Table 4.

#### The predictors of ASRS scores

The hypothesized relationship between ASRS scores and other variables was tested in two separate hierarchical multiple regression. The demographic variables (age) were entered in the first step of the hierarchical multiple regression. The subscales of BIS were entered in the second step of the hierarchical regression analyses. The results indicated that motor subscale was significantly predictive of ASRS scores ( $R^2 = .337$ , F(6,82)= 5.960, p = .00). The results of the hierarchical multiple regression were presented in Table 5.

#### Discussion

The aim of the present study was to examine the relationship of ADHD and impulsivity symptoms in a sample of female psychiatric patients with BPD and compare these symptoms with the healthy group.

One of the main findings of our study is high ADHD comorbidity in the BPD patient group. In our study, 53.3% of the BPD patient group had been diagnosed with adult ADHD. Our findings of a high prevalence of adult ADHD diagnosis among women with BPD supported the earlier findings and suggested that the childhood ADHD might be a risk factor for the development of BPD. According to Andrulonis et al. [24–26], 25% of the BPD patients (n = 106) had

<b>Table 5.</b> The results of the hierarchical multiple	e regression.
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	В	SE	β
Model 1			
(Constant)	36.481	5.076	
Age	0.098	0.212	0.049
Model 2			
(Constant)	0.203	7.970	
Age	0.085	0.179	0.043
Attention	0.337	0.460	0.083
Motor	0.692	0.302	0.271*
Cognitive complexity	-0.093	0.415	-0.024
Perseverance	0.544	0.350	0.149
Cognitive instability	0.876	0.542	0.162
Self-control	0.693	0.375	0.203
R <sup>2</sup>			0.337
F			5.960**

Notes: Dependent variable: total score of adult ADHD self-report scale. \*\*p < .01. \*p < .05. an ADHD story in their childhood. However, Bellak [27] determined a group consisted of the behaviours like impulsive, a learning problem, mood swings, and disorganized behaviours and touched upon the association between BPD and ADHD. Philipsen et al. examined the comorbidity of ADHD in 118 female BPD patients and confirmed that 16.1% of the patients had the comorbidity [14]. Furthermore, according to Ferrer et al., 38.1% of the BPD patients were diagnosed with adult ADHD [28]. Recently, 85 adolescents with BPD were studied by Speranza et al. and 11% of their sample had an ADHD diagnosis [29]. Fossati et al. reported a significant association between childhood symptoms and borderline features only in female patients mediated by impulsivity and emotion dysregulation [30].

Previous studies suggested that during childhood, some borderline personality features like impulsivity, emotional dysregulation, and self-harm were the predictive features of BPD [2,31]. Besides these features, impulsivity is a core feature of both BPD and ADHD symptomatology including poor inhibitory control, executive function, and self-regulation [4,32]. In our study, total BIS scores were significantly correlated with total ASRS and with its two subscales. These findings are consistent with previous studies [33]. Our study confirmed that impulsivity mediated the relationship between ADHD and BPD symptoms in BPD patients. These findings suggested that persistence of attention, motor impulsivity, and control/non-planning behavioural impulsivity may have represented the **BPD** features.

According to Davids and Gastpar [13], BPD is a heterogeneous group with some features characterized by prominent impulsive, affective, and dissociative features. ADHD is a risk factor for BPD patients with impulsive subgroup. This hypothesis was also proposed by Ferrer et al. as they suggested that BPD patients should have been separated into two subgroups according to the presence of ADHD that documents impulsive comorbidity [28].

In recent years, the comorbidity between ADHD and BPD and the association with impulsivity have been hypothesized among the young females. The subgroup of ADHD which consists of hyperactivity, impulsivity, and conduct disorder behavioural features is not common among females. Meanwhile, the inattention subgroup of ADHD is more common in females, and it causes social disinhibition, inappropriate behaviours, daydreaming, and distractibility. After the adolescence period, comorbid eating disorders and substance use disorders, conflicts with family members and decreased school performance can be seen [34-36]. Since our participants consisted of females only and ASRS scores correlated with inattention impulsivity scores, these findings supported this hypothesis.

In our study, when we compared the patient group with the healthy group in terms of BIS-11 and ASRS scores, we found that the average score of the patient group was significantly higher than the healthy controls. That means female patients with BPD have attention deficit, hyperactivity/impulsivity more characteristics than healthy controls. This finding is consistent with the diagnostic criteria proposed by DSM-5 for BPD. DSM-5 suggests that patients with BPD experience at least two areas of impulsivity (impulsive spending, sexual impulsivity, substance abuse/dependence, reckless driving) that are potentially harmful. Such patients show characteristic behaviours on a momentary basis without any plans or consideration of outcomes, and they have difficulties in planning or following up [16]. Most studies in the literature showed evidence of the differences between BPD patients and healthy controls in terms of high impulsivity scores. Prada et al. [37] compared the BIS and the ASRS scores between BPD patients and healthy controls and reported that the control subjects showed lower attention deficit-hyperactivity/impulsivity symptoms than all the clinical groups. Another study conducted by Ende et al. [38], who used the BIS to measure impulsivity and aggression between healthy controls and female BPD patients revealed results that are consistent with ours, i.e. patients have shown higher self-reported trait impulsivity (BIS total) compared to the healthy controls. Contrary to studies supporting our findings, Barker et al. [39] found no differences between BPD patients and healthy controls in terms of the BIS total scores. Furthermore, in a study conducted by Zamalloa et al. [40], BIS total scores of the healthy controls were found to be higher than BPD patients. In sum, although most studies in the literature supported that attention deficit-hyperactivity/ impulsivity symptoms are more common in the BPD patients than in the healthy controls, there were also negative studies showing no differences between the two groups in terms of attention deficit-hyperactivity/ impulsivity symptoms or that such symptoms were more common among healthy individuals. Therefore, more longitudinal prospective studies are needed to examine the frequency and severity of attention deficit-hyperactivity/impulsivity symptoms among female **BPD** patients.

Our results revealed that Motor subscale scores of the BIS were significantly predictive of ASRS scores. This finding might support the notion that the three major factors of impulsivity; namely attention impulsivity, motor impulsivity, and non-planning impulsivity might also be common in BPD patients. In the literature, Williams et al. [41] suggested that BPD patients with serious self-injurious behaviours had higher scores, especially on motor impulsiveness. We also found out that in BPD patients motor factor of the motor impulsiveness domain of impulsivity highly predicted attention deficit-hyperactivity/impulsivity symptoms. Furthermore, our results also supported the study by Speranza et al. [29] that a significant positive relationship between Barratt's Attentional/Cognitive impulsivity and ADHD diagnosis in borderline adolescents was found.

The results reported in this study should be considered in the light of certain limitations. First, ADHD symptoms and severity of impulsivity symptoms were assessed using self-report questionnaires. We diagnosed ADHD by using a self-report scale. But, it is known that the ADHD diagnosis needs to be supported the clinical interviews. This could explain the finding of the high comorbidity of ADHD. The second limitation is our participants primarily consisted of females with a number of small sample size. Finally, since this study has a cross-sectional nature, the results cannot show a direct association between ADHD and impulsivity symptoms in BPD patients.

In conclusion, our findings indicate that there is a significant association between ADHD and impulsivity symptoms in adult females with BPD. Hence, ADHD may be considered as a risk factor for predisposing BPD in adulthood. For this reason, more treatment strategies should be developed and focused on subgroups of BPD with or without ADHD.

#### **Disclosure statement**

No potential conflict of interest was reported by the authors.

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