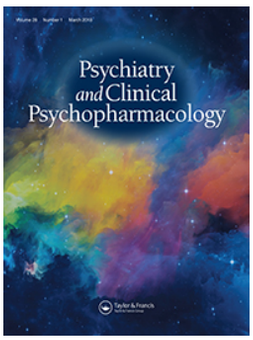

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Relationship of probable ADHD with novelty seeking, severity of psychopathology and borderline personality disorder in a sample of patients with opioid use disorder

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ABSTRACT

OBJECTIVE: The aim of the present study was to evaluate the relationship of probable attention-deficit hyperactivity disorder (ADHD) with novelty seeking (NS), the severity of psychopathology and borderline personality disorder (BPD) in a sample of male patients with opioid use disorder (OUD).

METHODS: Participants included 229 patients with OUD. Participants were evaluated with the Adult ADHD Self-Report Scale (ASRS-v1.1), the Symptom Checklist-90-Revised (SCL-90-R) and NS subscale of the Temperament and Character Inventory (TCI). In addition, BPD was assessed with the Structured Clinical Interview for DSM-III-R-Personality Disorders (SCID-II).

RESULTS: Age, duration of education, marital and employment status did not differ between those with probable ADHD ($n = 54$, 23.1%) and those without ($n = 175$, 76.9%). The severity of psychopathology, NS and subdimensions (other than NS1, which was lower) were higher among those with the probable ADHD. ADHD scores were midly correlated with NS scores, other than NS1. In logistic regression analyses, the severity of NS, particularly Impulsiveness (NS2), together with general psychopathology, predicted probable ADHD, whereas the presence of BPD had no effect.

CONCLUSIONS: These findings suggest that trait impulsivity, together with the severity of psychopathology, is related with the probable ADHD, while the presence of BPD has no effect among adult patients with OUD.

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ADHD; impulsiveness; novelty seeking; opioid use disorder; psychopathology

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a childhood-onset disorder characterized by hyperactivity/impulsivity (HI) and inattention (IN) that negatively impacts one's ability to function and fulfil social and personal obligations [1]. ADHD persists into adolescence and adulthood in more than half of the cases [2] and due to their symptoms individuals with ADHD experience more difficulties while coping with problems through their life and they become more vulnerable to use substance, while some may develop substance use disorder (SUD) [3,4]. Thus, ADHD is often diagnosed in SUD patients. In a large cross-sectional international study, the prevalence of adult ADHD was 13.9% in treatment-seeking SUD population [5], whereas according to a meta-analysis the prevalence for possible ADHD was 23.1% among individuals with SUD [6]. Individuals with ADHD and SUD comorbidity are at greater risk for more negative outcomes [7] and poor treatment outcomes for both SUD and ADHD [8].

Novelty seeking (NS) is a temperament trait in the Cloninger's model of personality and is considered moderately heritable, normally distributed, developmentally and situationally stable [9]. Individuals with high NS tend to be quick-tempered, excitable, exploratory, curious, enthusiastic, ardent, easily bored, impulsive and disorderly [10]. There is considerable evidence that high novelty seekers are at increased risk for using substance of abuse relative to low novelty seekers [11,12], NS represents a vulnerability factor for SUD in general [13,14], predicts early-onset SUD [15], is associated with the amount of substance used and severity of SUD [16] and a risk factor for dropping out of treatment [17]. Also, additional psychopathology seems to increase the risk of high NS among those with SUD [18].

The only population-based study of ADHD and temperament found positive associations of total ADHD symptoms with NS [19], whereas clinical studies consistently show that adults with ADHD score highly for NS [20–23]. Also, NS was positively

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correlated [22], was the predictor of [20] and was genetically associated [23] with both ADHD symptom dimension (IN and HI). The current findings suggest that, among the temperament dimensions, high NS may be related to adult ADHD symptoms, both IN and HI dimensions [24]. Ballon and colleagues [25] found a link between childhood ADHD, later sensation seeking in adults, and eventual cocaine dependence.

Treatment-seeking SUD patients with ADHD are at a very high risk for additional psychiatric disorders; 75% of ADHD patients had at least one additional comorbid disorder compared with 37% of SUD patients without ADHD [5]. If we specifically focus on opioid use disorder (OUD), few studies reported the effect of ADHD on patients receiving methadone maintenance treatment (MMT) in Western countries [26–28] in Israel [29] and in Taiwan [30]. In these studies, the prevalence of adult ADHD ranged between 16.7% and 24.9% [16,28,29], and also these studies showed that the risk of psychiatric comorbidity, including personality disorders, and the severity of psychopathology are increased among those with ADHD [26–30].

Both epidemiological and clinical studies have reported a high prevalence of personality disorders in populations with SUD [31], particularly borderline personality disorder (BPD) of B cluster [32–34]. These personality disorders were found to be associated with increased risk for the poorest overall outcomes in patients with SUD [35], such as early onset of SUD, regular intoxication, more extensive and severe substance use problems than those without diagnoses of these personalities [33,36]. Similarly, comorbid emotional, dramatic or erratic Cluster B personality disorders are most frequent in patients with ADHD, both in clinical [37] and epidemiologic [38] samples. ADHD has been associated with different personality disorders, in particular BPD [39–41]. In the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), the highest frequency was for BPD comorbidity (33.7%) [38]. NS has been suggested to be a fundamental aspect of BPD [42,43]. BPD patients with additional depression have more SUD comorbidity and higher NS [42]. An outspoken NS temperament suggests vulnerability for the development of ADHD and co-occurring BPD [41]. Finally, the combination of impulsivity, aggression, NS and juvenile conduct problems completely mediate the relationship between retrospectively assessed ADHD symptoms and current BPD features [44].

By solely focusing on ADHD symptoms in populations such as OUD, researchers and clinicians alike may be ignoring an important contributing factor, such as NS. Comorbid psychopathology is common among patients with OUD [45], when BPD is present among patients with SUD, then the risk of comorbid psychopathology is even higher [46]. When evaluating the relationship between ADHD and NS, the presence of BPD and severity of psychopathology should also be controlled. Thus, the aim of the present study was to evaluate the relationship of probable ADHD with the severity of NS, while controlling the presence of BPD and severity of psychopathology in a sample of patients with OUD.

Material and methods

Subjects

The study was conducted in Bakirkoy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, Alcohol and Drug Research, Treatment and Training Center in Istanbul between September 2014 and April 2015. It is a specialized centre for SUDs with 84 inpatient beds (48 beds for SUD other than alcohol) and accepts patients from all over Turkey. The study was approved by the Ethical Committee of the institution. Patients' written informed consent was obtained after the study protocol was thoroughly explained.

Consecutively admitted 229 male patients (114 inpatients and 115 outpatients) with OUD were considered for participation in the study. All participants met the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [47] diagnostic criteria for OUD according to the psychiatric interview conducted by an expert clinician. Interviews with the study group were conducted after a stabilization period, that is, 1–2 weeks after the last day of heroin use.

Measures

All patients were assessed by using a semi-structured sociodemographic form. This form included variables such as current age, duration of education, marital and employment status. In addition, the diagnoses of BPD was evaluated with the relevant section of the Structured Clinical Interview for DSM-III-R-Personality Disorders (SCID-II) [48], Turkish version [49], conducted by a trained interviewer (CE).

Adult ADHD Self-Report Scale (ASRS)

In conjunction with the World Health Organization (WHO) Kessler et al. [50] developed a self-report scale for the screening of ADHD in adults (ASRS-v1.1; 10). The scale they propose is a short, 18-item scale (9 item for IN and 9 items for HI) which relates directly to the DSM-IV-TR diagnostic criteria. These 18 statements describing aspects of ADHD that are rated on a 5-point Likert scale from "0-never" to "4-very often." The ASRS is a widely used and validated instrument, the 6-item screening version of which has been shown to outperform the full 18-item version

in sensitivity (68.7% vs. 56.3%), specificity (99.5% vs. 98.3%) in American general population [51,52]. The scale was validated in Turkish in a sample of university students previously [53]. Specifically, in a sample of patients with alcohol use disorder, psychometric characteristics of the Turkish version have been analysed [54], in which satisfactory properties have been found. In the present study, 18-item version was used in order to evaluate the severity of IN and HI symptoms. The severity of these dimensions was measured by summing the scores of each 9 items per subscale. ASRS-18 evaluates the symptoms of ADHD for over the past 6 months. Also, patients were evaluated retrospectively for the presence of these symptoms or similar symptoms in childhood, as a prerequisite for the ADHD diagnosis in adulthood. When evaluating a patient's history, evidence of early-appearing and long-standing problems with attention or self-control were considered. Some significant symptoms should have been present in childhood, but full symptomology is not necessary. Nevertheless, the result of the test does not replace a clinical diagnosis and the clinician must take false positives into consideration by evaluating ASRS positives with gold standard scales. Thus, we used the term "probable ADHD" for those who are considered as ASRS positive.

Symptom Checklist-Revised (SCL-90-R)

SCL-90-R is a self-report measure [55] used to assess psychopathologic symptoms. It has 90 items rated with a 5- point Likert scale (1, no problem to 5, very serious) to assess the extent to which individuals have experienced the listed symptoms in the last 7 days. These 90 items were grouped into nine subscales, namely, somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. It was suggested that the higher the scores on SCL-90-R is, the higher the psychological distress that the individual has experienced. In the present study, the Turkish version of SCL-90-R was used [56].

Temperament and Character Inventory

For evaluation of NS, the Temperament and Character Inventory (TCI) [9] was used in the Turkish version, forced-choice, self-report scale [57]. NS is a 40-item multifaceted higher order temperament trait that consists of the following four aspects of lower order traits: Exploratory Excitability versus Stoic Rigidity (NS1) (11 items), Impulsiveness versus Reflection (NS2) (10 items), Extravagance versus Reserve (NS3) (9 items) and Disorderliness versus Regimentation (NS4) (10 items). The reliability and validity of the Turkish version of the TCI were supported by its psychometric properties and construct validity [57]. In the Turkish version, Cronbach's alpha was 0.74 for NS [57]. In the present study, Cronbach's alpha was 0.84.

Data analysis

The statistical package Statistical Packages for the Social Sciences (SPSS) 15.0 for Windows was used for all the analyses. Categorical variables were compared by means of the chi-square statistics. Odds ratios and 95% confidence intervals were calculated. We used Student's *t*-test to compare the groups on continuous variables. Pearson correlation was used to evaluate relationships between ADHD, NS and SCL-90 scores. Taking probable ADHD as a dependent variable, two logistic regression models were performed. For all statistical analysis, *p* values were two-tailed and differences were considered significant at $p < .01$.

Results

Age, duration of education, marital and employment status did not differ between those with the probable ADHD ($n = 54$, 23.1%) and those without ($n = 175$, 76.9%) (for all analyses $p > .05$). The severity of psychopathology, NS and subdimensions (other than NS1, which was lower, $p = .002$) were higher among those with the high ADHD risk (for all analyses $p < .001$) (Table 1).

ADHD scores were mildly correlated with NS scores ($p < .001$), other than NS1, which was not correlated with ADHD scores (Table 2).

In the first logistic regression analysis, when severity of general psychopathology, the presence of BPD and

Table 1. Sociodemographic and scale scores according to the presence of probable ADHD.

	With probable ADHD		Without probable ADHD			
	$n = 175$, 76.9%		$n = 54$, 23.1%			
	Mean	S.D.	Mean	S.D.	*t*	*p*
Age	27.03	7.41	27.83	8.53	−0.673	.502
Duration of education	9.03	2.78	8.74	3.10	0.667	.505
SCL-90	12.83	7.09	18.95	7.34	−5.496	<.001
Exploratory excitability (NS1)	5.93	1.87	5.02	1.99	3.076	.002
Impulsiveness (NS2)	3.93	2.14	5.56	1.92	−4.995	<.001
Extravagance (NS3)	5.69	2.00	6.80	1.78	−3.638	<.001
Disorderliness (NS4)	3.99	1.93	5.39	2.01	−4.603	<.001
Novelty Seeking (NS)	19.54	4.85	22.76	4.76	−4.278	<.001
	n	%	*n*	%	χ^2	*p*
BPD[a]	32	16.8	13	23.6	1.313	.252
Marital status[a]					0.807	.668
Single	137	78.3	45	83.3		
Maried	27	15.4	6	11.1		
Divorced	11	6.3	3	5.6		
Employment status[a]					2.079	.354
Not working	113	64.6	40	74.1		
Employed	43	24.6	8	14.8		
Parttime employed	19	10.9	6	11.1		

[a]Chi-square test.

Notes: Independent Samples *t*-test, S.D.:Standard deviation, SCL-90: Symptom Checklist-90-Revised, BPD: Borderline personality disorder, Significance at $p < .05$.

Table 2. Correlations between scale scores.

$N = 229$	IN	HI	ASRS	SCL-90
Exploratory excitability (NS1)	−0.192**	−0.030***	−0.128***	−0.161***
Impulsiveness (NS2)	0.358*	0.356*	0.392*	0.369*
Extravagance (NS3)	0.248*	0.231*	0.263*	0.329*
Disorderliness (NS4)	0.296*	0.310*	0.332*	0.302*
Novelty Seeking (NS)	0.302*	0.363*	0.362*	0.352*
SCL-90	0.490*	0.385*	0.484*	

*$p < .001$, **$p < .05$, ***$p > .05$, SCL-90: Symptom Checklist-90-Revised.

severity of NS were independent variables, severities of general psychopathology ($B = 0.096$, S.E. = 0.024, $p < .001$) and NS ($B = 0.097$, S.E. = 0.037, $p = .009$) predicted the presence probable ADHD (Table 3). In the second logistic regression analysis, when subdimensions of NS were entered in the analysis as independent variables instead of the NS total score, general psychopathology ($B = 0.093$, S.E. = 0.024, $p < .001$) and Impulsiveness (NS2) dimension ($B = 0.283$, S.E. = 0.085, $p = .001$) predicted the probable ADHD (Table 3). In the third logistic regression analysis, when subdimensions of SCL-90 were entered in the analysis as independent variables instead of SCL-90 total score, obsessive-compulsive symptoms (OCS) ($B = 0.946$, S.E. = 0.219, $p < .001$) and Impulsiveness (NS2) dimension ($B = 0.280$, S.E. = 0.086, $p = .001$) predicted the probable ADHD (Table 3).

Discussion

The rate of high ADHD risk found in this study (23.1%) was in concordance with the rates found among patients with OUD in previous studies, which ranged between 21.4% [29] and 24.9% [28]. The main finding of the present study was that higher NS scores, particularly Impulsiveness (NS2) predicted the probable ADHD among men with OUD, together with the severity of general psychopathology. Consistent with these findings, the severity of NS was found to be related with ADHD in the previous studies [24], whereas this is the first study to relate NS with ADHD among patients with OUD, while controlling the presence of BPD and severity of psychopathology. Interestingly, BPD did not predict high ADHD risk among patients with OUD, which suggests that although BPD is commonly comorbid with both SUD and ADHD, the presence of ADHD does not contribute additional risk for BPD among male patients with OUD. Those without the BPD diagnosis may meet some of the items of BPD even if they do not meet the diagnostic criteria, and the characteristics of this group may be similar to those that meet the diagnostic criteria of BPD in the patients with OUD [58]. Nevertheless, clinical presentation of patients with BPD may differ according to the gender [59]. Unfortunately, the sample included only male patients, and the results may have been different if female patients could have been included in the study. This is one of the limitations in the present study.

NS is associated with impulsivity, rule violation and unsafe behaviours [60]. Individuals with high NS tend to be impulsive, wasteful, unorganized, impatient, easily agitated, thrill-seeking and extemporaneous in their speech [61]. According to a previous study that evaluated the association of ADHD with NS, suggested that the NS trait plays a central role in ADHD diagnosis even when items referred to impulsivity are removed from the NS scale [62]. Finding NS to be related with probable ADHD even after controlling the presence of BPD and severity of psychopathology in the present study may suggest that relationship of ADHD with OUD may be through NS, at least partially.

Patients with OUD mostly use an immature defence mechanism (particularly acting out and splitting, which are characteristic for BPD), which is also correlated with NS, suggesting that even heroin use itself may be a maladaptive coping efforts of these patients with high NS, although the use of maladaptive defences might also be the consequence of long-term OUD [63]. As there is no clear cause-and-effect relation between NS and SUD, which seems to synergistically influence each other [64]. Thus, the NS trait can be valuable not only for predicting individual vulnerability to SUD but also for generating successful treatment for patients with SUDs [64].

High impulsivity in children with ADHD plays a key role in their vulnerability to SUD [65]. Impulsivity is a major component of various disorders, including

Table 3. Predictors of probable ADHD in a logistic regression.

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	*p*	Exp(B)	Lower	Upper
Model 1	SCL-90	0.096	0.024	15.659	1	<.001	1.101	1.050	1.155
	BPD	−0.104	0.414	0.063	1	.802	0.902	0.401	2.028
	Novelty Seeking (NS)	0.097	0.037	6.922	1	.009	1.102	1.025	1.185
Model 2	SCL-90	0.093	0.024	14.517	1	<.001	1.097	1.046	1.151
	BPD	−0.162	0.411	0.155	1	.694	0.851	0.380	1.903
	Impulsiveness (NS2)	0.283	0.085	11.058	1	.001	1.327	1.123	1.567
Model 3	Obsessive-compulsive	0.946	0.219	18.662	1	<.001	2.575	1.676	3.954
	BPD	−0.057	0.420	0.018	1	.893	0.945	0.415	2.154
	Impulsiveness (NS2)	0.280	0.086	10.668	1	.001	1.323	1.119	1.566

Notes: Nagelkerke R^2 = Model 1 = 0.213, Model 2 = 0.237 and Model 3 = 0.263. SCL-90: Symptom Checklist-90-Revised, BPD: Borderline personality disorder, Significance at $p < .05$.

ADHD, SUD and BPD. Impulsivity is even higher if these diagnoses are comorbid; such as ADHD and BPD [66], BPD and SUD [67,68], and ADHD and SUD [69]. Consistent with these, among subscales of NS, Impulsiveness, which can also be called as trait impulsivity, was the main subscale that is related with probable ADHD among patients with OUD. Another interesting finding was that although a correlation with explatory excitability (NS1) and ADHD score severity was expected, these two variables were not related in the present study. Unfortunately, we did not find any previous study that particularly evaluated the relationship between these two variables and we do not have enough data to explain this finding in patients with OUD.

Finally, another finding of the present study was that severity of OCS was the only predictor of probable ADHD among other SCL-90-R subscales. ADHD and obsessive-compulsive disorder co-occur at a higher than expected rate [70]. In addition to this, several studies have shown elevated levels of OCS among those with ADHD [71–73]. Among adults with ADHD, the highest elevation on the SCL-90-R has been found on the OCS [55]. This was the only scale where the mean T-score was above 70 [73]. Finally, finding obsessive thoughts is fairly common among ADHD subjects, Brown et al. [74] suggested that this calls into question whether obsessive or distracting thoughts should be considered as part of the diagnostic criteria for ADHD within future versions of the DSM.

The present study has some limitations. First, because this study is cross-sectional, its findings cannot indicate the causal relationships among the primary constructs of interest. Second, although all the scales used in the present study were validated in Turkish, since some of them are self-rating screening scales, they may only indicate the individuals with a high probability of ADHD or psychopathology, rather than the diagnosis. Thus, actually we evaluated the probable ADHD rather than the diagnosis of ADHD, and it is suggested that the severity of ADHD symptoms may change according to the sample, the scale that is used to measure ADHD symptoms, and design of the study [75]. Although currently Turkish versions of structured and semi-structured clinical interviews are introduced for adults, they are not validated in populations with SUD, whereas ASRS was validated in these populations, including the Turkish version [54,55]. Third, female patients may have a different profile concerning psychopathology, BPD, NS and ADHD. Indeed, current evidence indicates that there are notable gender differences in BPD, such that men with BPD having higher levels of NS [43,76] are more likely to evidence SUD, to have treatment histories relating to SUD than women with BPD [76]. Fourth, although the main reason for evaluating only BPD in the present study was that it is the most prevalent personality disorder in both OUD and ADHD patients, not evaluating other personality disorders, which may also be prevalent among these patients is another limitation. Fifth, we did not evaluate traumas, especially interpersonal traumas which are thought to be important in both ADHD and BPD [77,78]. Finally, the generalizability of the findings of the present study to the wider, non-treatment seeking, mixed-gender and homogeneous populations of patients with SUDs requires further study.

In conclusion, from the clinical perspective, the fact that ADHD occurs at extremely high levels among patients with OUD, and is strongly associated with NS, particularly Impulsiveness, needs to be borne in mind when assessing risk. Thus, to better understand ADHD among patients with OUD, clinicians must carefully evaluate NS among this population.

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The study was conducted according to the WMA Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects. The study was approved by the Ethical Committee of the institution. All participants gave their verbal and written informed consent.

Disclosure statement

No potential conflict of interest was reported by the authors.

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