








# Relationship between Suicide Attempt History and Borderline Personality Disorder, Aggression, Impulsivity, and Self-Mutilative Behavior among Male Inpatients with Substance Use Disorder

Vahap Karabulut<sup>1</sup> , Cuneyt Evren<sup>1</sup> , İzgi Alniak<sup>1</sup> , Ozlem Helin Carkci<sup>1</sup> , Gokhan Umut<sup>1</sup> , Turan Cetin<sup>1</sup> , Hanife Yilmaz Cengel<sup>2</sup> 

<sup>1</sup>Research, Treatment and Training Centre for Alcohol and Substance Dependence (AMATEM), Bakirkoy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, Istanbul, Turkey; <sup>2</sup>Department of Psychology, Istanbul Gelişim University, School of Economics, Administrative and Social Sciences, Istanbul, Turkey

## ABSTRACT

**Objective:** The purpose of this study was to evaluate the relationship between lifetime history of suicide attempt (HSA) and borderline personality disorder (BPD), aggression, impulsivity, and self-mutilative behavior (SMB) in a sample of male inpatients with substance use disorder (SUD).

**Method:** The sample included 132 male inpatients with alcohol or opioid use disorder. The participants were evaluated using the Buss-Perry Aggression Questionnaire, the Short Form of the Barratt Impulsiveness Scale (BIS-11-SF), and a structured clinical interview for DSM-IV Axis II Personality Disorders (SCID-II) for BPD.

**Results:** The mean age was lower in the group with HSA ( $n = 52$ , 39.4%) compared to the group without HSA ( $n = 80$ , 60.6%), whereas no difference was found between the groups in terms of duration of education, alcohol or opioid use disorder, marital status, and employment status. The rate of BPD and SMB and aggression and impulsivity scores were higher among those with lifetime HSA. According to linear regression analysis, although BPD, anger, and non-planning impulsivity predicted HSA, when SMB was included in the analysis BPD was no longer a predictor. SMB, on the other hand, predicted HSA together with anger and non-planning impulsivity.

**Conclusion:** While BPD and HSA are associated, SMB seems to have a mediating role in this relationship. In addition, anger and non-planning impulsivity may have a partial mediating role in the relationship between BPD and HSA among patients with SUD.

## ARTICLE HISTORY

Received: 3 July, 2020

Accepted: 27 September, 2020

**KEYWORDS:** Aggression, borderline personality disorder, impulsivity, self-mutilative behavior, substance use disorder, suicide

## INTRODUCTION

Substance use disorder (SUD) is associated with an increased risk of suicidal ideation and suicide attempt.<sup>1</sup> Experts on addiction often encounter suicidal behavior in patients with addiction. Although many addiction treatment programs do not accept patients with recent suicidal behavior, as many as 40% of patients seeking treatment for substance abuse report a history of suicide attempt (HSA).<sup>2</sup> Compared to the general population, those with SUD are about 10 times more likely to die because of suicide.<sup>3</sup> Alcohol and opioids are the substances associated with the greatest risk of suicidal behavior.<sup>4</sup> Therefore, an investigation of the relationships between the conditions that pose a risk to patients with HSA can contribute to

the development of effective and targeted preventive and interventional programs for these patients.

A number of sociodemographic and clinical risk factors associated with suicide have been identified with SUD.<sup>5-7</sup> In addition to mental disorders such as major depression, bipolar disorder, and post-traumatic stress disorder, borderline personality disorder (BPD) is also one of the important factors associated with suicidal behavior, especially in those with SUD.<sup>2</sup> BPD was found in approximately 44% of outpatients treated with buprenorphine for opioid addiction.<sup>8</sup> Meta-analyses<sup>9</sup> and longitudinal studies<sup>10</sup> provide consistent data suggesting that BPD has a stronger relationship with suicide attempts

**Corresponding author:** Vahap Karabulut, E-mail: v-karabulut@hotmail.com

**Cite this article as:** Karabulut V, Evren C, Alniak İ, et al. Relationship between suicide attempt history and borderline personality disorder, aggression, impulsivity, and self-mutilative behavior among male inpatients with substance use disorder. *Psychiatr Clin Psychopharmacol.* 2021; 31(2): 139-147.



Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

compared to other mental disorders. BPD has the highest suicide risk among individuals suffering from mental disorders, with suicide rates ranging from 3% to 9%.<sup>11</sup> BPD is a serious mental disorder with a characteristic pervasive pattern of instability in affect regulation, impulse control, interpersonal relationships, and self-image. Clinical symptoms of BPD include emotional dysregulation, impulsivity, aggression, repeated self-injury, and chronic suicidal tendencies.<sup>12</sup> Patients with BPD are reported to self-harm not only as an act of suicide due to abnormalities in opioid activity but also as a way of alleviating psychic pain.<sup>13</sup>

“Suicide attempt” refers to engagement in potentially self-injurious behavior in which there is some intent to die because of that behavior, while “self-mutilative behavior” (SMB) refers to direct and deliberate destruction of body tissue in the absence of any observable intent to die.<sup>14</sup> The relationship between SMB and suicide are paradoxical. Some authors describe self-mutilation as a protective factor against suicide. SMB can be described as a weakened form of suicide (focal suicide). Thus, SMB plays the role of anti-suicide action, allowing patients to come out of dissociation and feel alive again. As long as self-mutilation provides the expected relief, the risk of suicide does not increase.<sup>15</sup> However, many authors consider self-mutilation to be a risk factor for completed suicide. The results of previous studies highlight the possibility of SMB as a risk factor for suicide attempt in BPD.<sup>15</sup> In one meta-analysis, the strongest predictor of HSA was found to be suicidal ideation, followed by frequency of SMB, number of SMB methods, and hopelessness.<sup>9</sup>

Anger, aggression, and impulsivity are also personality traits associated with suicide attempts.<sup>16-18</sup> The term aggression is used in the literature to refer to a wide range of behaviors.<sup>19</sup> Trait aggression as the motor component of behavior refers to a tendency to engage in physical and verbal aggression that involves hurting or harming others.<sup>20</sup> Trait anger is the tendency to feel anger more intensely, more frequently, and for a longer period of time compared to others.<sup>21</sup> Anger, which involves physiological arousal and preparation for aggression, represents the emotional or affective component of behavior.<sup>20</sup> Hostility, which is another concept associated with aggression, involves feelings of ill will and injustice and represents the cognitive component of behavior.<sup>20</sup> Individuals who have difficulty in controlling anger are more likely to act impulsively and turn violent on themselves rather than others.<sup>22</sup> Although there are various definitions available depending on the focus of the study, in general, impulsivity is conceptualized as the tendency to act without prior thought.<sup>23</sup> Impulsive choice refers to the selection of small short-term gains instead of larger delayed gains, or large delayed penalties instead of smaller immediate penalties.<sup>24</sup> Greater motor activation, less attention,

and reduced ability to plan actions are key factors for impulsivity.<sup>25</sup> Individuals who are highly impulsive may be motivated to act without thinking in negative emotional circumstances.<sup>26</sup> Therefore, high levels of impulsivity/aggression in negative emotional situations caused by substance use and withdrawal may increase the likelihood of SMB in these individuals.

Constructs related to aggression and impulsivity carry additional risk for suicidal behavior in those with alcohol and opioid use disorder (OUD).<sup>27,28</sup> Similar to the association with suicide, one meta-analysis suggests that those who engage in SMB also report higher impulsivity than those who do not.<sup>29</sup> In one study conducted with detoxified individuals with alcohol use disorder (AUD), the incidence of life-long aggressive behavior and aggression/impulsivity scores were higher in those with HSA.<sup>30</sup> In addition, studies show that aggression has an indirect relationship with suicidal behavior and that it is mediated by the acquired capability for suicide. Individuals with AUD who have higher aggression are more likely to attempt suicide because they are not afraid of death and are insensitive to physical pain.<sup>31</sup> Research shows that completed suicide is not usually impulsively performed, although those with history of suicide attempts tend to be more impulsive than those without.<sup>32</sup> Impulsive suicide attempts are cases of SMB which are less premeditated or involve less preparation than non-impulsive suicide attempts.<sup>33</sup> Therefore, it is possible to see more SMB signs as well as increased impulsivity in those with HSA.

In patients with SUD, factors such as BPD, SMB, and impulsivity/aggression are assumed to be both directly and indirectly associated with suicide. However, the relationship between all these endophenotypes associated with substance use and suicide is not clear enough. Although individuals with BPD are a high-risk group for suicidal behavior, it is important to determine how other possible factors play a mediating role and whether or not BPD alone can predict suicide in individuals with AUD and OUD. According to our hypothesis, we thought that aggression, impulsivity, the presence of SMB, and comorbidity of BPD are factors related to HSA in SUD and that SMB functions as the main mediator on this relationship. The purpose of this study is to evaluate the relationship between lifetime HSA and BPD, aggression, impulsivity, and SMB in a sample with SUD (alcohol and opioid). Assessment of these psychopathological factors may allow for clinical suicide risk assessment in patients with SUD by identifying high-risk subgroups.

## METHODS

### Participants

The study was conducted in the Alcohol and Substance Service (AMATEM) of Bakırköy Mental and Nervous

Diseases Training and Research Hospital. The center, which specializes in alcohol and SUDs with an inpatient bed capacity of 84, accepts patients from all over Turkey. The procedures used in the study complied with the ethical standards of our local committee on human experimentation and the Declaration of Helsinki.<sup>34</sup>

A total of 157 consecutive male patients with a diagnosis of AUD ( $n = 84$ ) and OUD ( $n = 73$ ) who received inpatient treatment at the clinic were included in the cross-sectional study. After extracting the data of patients who did not fill the scales or did not fill them completely, the data of 132 patients (alcohol [ $n = 72$ ] and opioid [ $n = 60$ ]) were evaluated.

The statistical analysis included data from 132 patients who were diagnosed with AUD ( $n = 72$ ) and OUD ( $n = 60$ ). The mean age was lower in the group with HSA ( $n = 52$ , 39.4%) than the group without HSA ( $n = 80$ , 60.6%) ( $34.06 \pm 11.10$  vs.  $39.28 \pm 13.79$ , respectively,  $P = .018$ ). There was no significant difference between the groups in terms of duration of education, AUD or OUD, marital status, and employment status (Table 1).

### Procedures

AUD and OUD diagnoses of all participants were based on the Structural Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).<sup>35</sup> In addition, the diagnosis of BPD was assessed with reference to the Structural Clinical Interview for DSM-III-R Axis II Personality Disorders BPD Module's<sup>36</sup> Turkish version<sup>37</sup> done by a trained interviewer. Before the procedures were implemented, the purpose of the study was fully explained to the participants and they were told not to hesitate if they had any questions. The scales were

handed out in the second week after obtaining written consent from patients who were willing to participate in the study. All participants were assessed using a semi-structured sociodemographic and clinical information form including questions concerning variables, such as the pattern of substance use, HSA, and SMB, the Buss-Perry Aggression Questionnaire (BPAQ), the Short Form of Barratt Impulsivity Scale (BIS-11-SF), and the Structured Clinical Interview for DSM-III-R Axis II Personality Disorders (SCID-II). SUD involving substances other than alcohol and opioid and other psychiatric disorders were considered as exclusion criteria.

### Instruments

**HSA and SMB Evaluation:** In the sociodemographic and clinical information form, HSA was evaluated by asking "Have you ever attempted suicide?" and SMB was evaluated by asking "Have you ever acted self-destructively?". In addition, explanations were requested regarding the frequency and form of suicide or SMB. A suicide attempt must at least have the actual or believed potential for death as an outcome. SMB means the deliberate and direct destruction of body tissue without conscious suicidal intent, but resulting in injury severe enough for tissue damage to occur.

**Barratt Impulsivity Scale-11-SF (BIS-11-SF):** BIS-11 is a 30-item scale filled out by the patient to assess impulsivity.<sup>38</sup> The Turkish validity and reliability study of the scale was conducted by Gulec et al.<sup>39</sup> A 15-item form of BIS-11-SF that preserves the three-factor structure (non-planning, motor impulsivity, and attention impulsivity) and shows good reliability and validity was developed by Spinella.<sup>40</sup> The adaptation of the Turkish version of this scale was

**Table 1.** Comparison of Sociodemographic Data by Suicide Attempt History

	No Suicide Attempt ( $n = 80$ , 60.6%)		Suicide Attempt ( $n = 52$ , 39.4%)		$t/\chi^2$	$P$	Effect Size (Cohen's $d$ )
	Mean	SD	Mean	SD			
Age	39.28	13.79	34.06	11.10	2.395	.018	0.417
Duration of education	9.03	3.61	8.70	2.78	0.548	.585	0.102
	$n$	%	$n$	%	$\chi^2$	$P$	
Alcohol/opioid					0.238	.626	
Alcohol	45	56.3	27	51.9			
Opioid	35	43.8	25	48.1			
Marital status					0.366	.833	
Married	27	33.8	18	34.6			
Single	39	48.8	23	44.2			
Divorced/widowed	14	17.5	11	21.2			
Employment status					0.570	.903	
Unemployed	49	61.3	36	69.2			
Employed	18	22.5	6	11.5			
Part-time	5	6.3	5	9.6			
Retired	8	10.0	5	9.6			

performed by Tamam et al.<sup>41</sup> The higher the total BIS-11 score, the higher the person's level of impulsivity.

**Buss-Perry Aggression Questionnaire (BPAQ):** BPAQ is a 29-item scale used to assess the respondent's level of aggression.<sup>20</sup> The scale consists of 4 factors. Trait aggression was measured according to the BPAQ total score and factor scores (physical aggression, verbal aggression, anger, and hostility). The Turkish version of BPAQ was found to be valid and reliable in studies with university students<sup>42</sup> and inpatients with substance use.<sup>43</sup>

**Structured Clinical Interview for DSM-III-R Axis II Personality Disorders (SCID-II) BPD Module**

The instrument was developed for the evaluation of personality disorders,<sup>36</sup> translated into Turkish by Sorias et al.,<sup>37</sup> and tested for reliability by Coşkunol et al.<sup>44</sup> The participants of this study answered the questions in the SCID-II BPD Module with either “yes” or “no.” The BPD diagnosis was made if the patient met at least 5 of the 9 diagnostic criteria listed in SCID-II ([1] efforts to avoid real or imagined abandonment, [2] unstable and intense interpersonal relationships, [3] identity disturbance, [4] impulsivity in at least 2 areas, [5] recurrent suicidal behavior or SMB, [6] affective instability, [7] chronic feelings of emptiness, [8] inappropriate, intense anger or difficulty controlling anger, and [9] transient, stress-related paranoid ideation).

**Statistical Analysis**

Statistical Package for the Social Sciences (SPSS) version 18.0 (IBM SPSS Corp.; Armonk, NY, USA) for Windows was used for statistical analysis. The variables showed normal distribution according to the results of the Kolmogorov-Smirnov test for normality ( $P > .05$ ). Categorical sociodemographic variables were compared using the Chi-square test. The Student's *t*-test was used to compare groups for continuous variables. Effect size Cohen's *d* was also calculated. A logistic regression analysis was performed where HSA was the dependent variable and BPD was the

independent variable in the first step, anger in the second step, non-planning impulsivity in the third step, and SMB in the last step. For all statistical analyses, *P* values were 2-tailed and  $P < .05$  was considered statistically significant.

**RESULTS**

A comparison of sociodemographic data by suicide attempt history is shown in Table 1, and descriptive statistics of BPAQ and BIS-11-SF scales and their sub-scales are shown in Table 2.

Table 3 shows the comparison between the BPD, SMB, aggression, and impulsivity scores of those with HSA and those without HSA. Those with HSA had a significantly higher rate of BPD diagnosis (50% vs. 18.8%, respectively,  $P < .001$ ), SMB rate (80.8% vs. 48.7%, respectively,  $P < .001$ ), BPAQ score ( $52.90 \pm 19.32$  vs.  $38.56 \pm 17.46$ , respectively,  $P < .001$ ), and BIS-11-SF score ( $21.25 \pm 8.11$  vs.  $15.86 \pm 6.65$ , respectively,  $P < .001$ ). All BPAQ and BIS-11-SF factor scores showed higher statistical significance as well (Table 3).

The factors that predict HSA were assessed in 4 steps in the hierarchical logistic regression analysis (Table 4). Although BPD, anger, and non-planning impulsivity predicted HSA in the linear regression analysis, BPD was no longer a predictor when SMB was included in the analysis. SMB, anger, and non-planning impulsivity predicted HSA.

**DISCUSSION**

As consistent with our hypothesis, the main finding of this study is that although HSA is associated with every psychopathological variable assessed in this study, anger, non-planning impulsivity, and SMB predicted HSA. Although BPD and HSA are associated, SMB appears to have a mediating role in this relationship. In addition, anger and non-planning impulsivity may have a partially mediating role in the relationship between BPD and HSA. These results are largely consistent with the data

**Table 2.** Descriptive Statistics of BPAQ and BIS-11-SF Scales and Their Sub-scales

	BPAQ	PA	VA	A	H	BIS-11-SF	NPI	MI	AI
<i>n</i>	132	132	132	132	132	132	132	132	132
Mean	44.21	10.59	8.48	11.77	13.37	17.98	7.11	5.80	5.08
Median	41.00	9.00	9.00	11.00	13.00	17.50	7.50	6.00	5.00
Mode	36.00	8.00	11.00	4.00	16.00	13.00	9.00	6.00	3.00
SD	19.46	6.60	4.06	6.29	7.06	7.70	3.68	3.11	3.15
Skewness	0.488	0.515	0.295	0.526	0.329	0.471	-0.120	0.427	0.882
Kurtosis	0.075	-0.402	0.194	-0.230	-0.328	0.676	-0.262	-0.182	0.692
Range	106.00	31.00	20.00	28.00	31.00	40.00	15.00	15.00	15.00
Minimum	2.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
Maximum	108.00	31.00	20.00	28.00	32.00	42.00	15.00	15.00	15.00

BPAQ, Buss-Perry Aggression Questionnaire; PA, physical aggression; VA, verbal aggression; A, anger; H, hostility; BIS-II-SF, Barratt Impulsivity Scale-11-Short form; NPI, non-planning impulsivity; MI, motor impulsivity; AI, attention impulsivity; SD, standard deviation.

**Table 3.** Comparison of Scale Scores by Suicide Attempt History

	No Suicide Attempt ( <i>n</i> = 80, 60.6%)		Suicide Attempt ( <i>n</i> = 52, 39.4%)		<i>t</i> / $\chi^2$	<i>P</i>	Effect Size (Cohen's <i>d</i> )
	Mean	SD	Mean	SD			
BPAQ	38.56	17.46	52.90	19.32	-4.420	<.001	0.779
Physical aggression	8.86	5.43	13.25	7.36	-3.693	<.001	0.679
Verbal aggression	7.81	3.99	9.50	3.99	-2.372	.019	0.424
Anger	10.01	5.75	14.48	6.17	-4.240	<.001	0.750
Hostility	11.88	6.41	15.67	7.45	-3.119	.002	0.545
BIS-11-SF	15.86	6.65	21.25	8.11	-6.052	<.001	0.727
Non-planning	6.21	3.73	8.50	3.15	-3.442	.001	0.663
Motor	5.09	2.87	6.89	3.16	-4.936	<.001	0.596
Attention	4.56	2.55	5.87	3.79	-5.223	<.001	0.406
	<i>n</i>	%	<i>n</i>	%	$\chi^2$	<i>P</i>	
SMB*	38	48.7	47	80.8	13.542	<.001	
BPD†	15	18.8	26	50.0	14.375	<.001	

Odds ratio (95% CI): \*4.421 (1.947-10.040); †4.333 (1.984-9.467).

BPAQ, Buss-Perry Aggression Questionnaire; BIS-11-SF, Barratt Impulsivity Scale-11-Short form; SMB, self-mutilative behavior; BPD, borderline personality disorder.

in the literature. In parallel with our study, BPD,<sup>7</sup> anger, and borderline personality traits,<sup>45</sup> highly impulsive and aggressive behaviors,<sup>30,46</sup> and trait anger<sup>47</sup> were suggested as psychopathological factors associated with HSA in patients with SUD.

These traits, however, do not show the same consistency in all studies. Psychopathological characteristics such as impulsivity, aggression, and BPD, which we investigated in relation to suicide, were analyzed separately in most studies. A recent study reported that lifetime HSA was strongly associated with both high impulsivity and high aggression, but not with trait anger.<sup>48</sup> Another study, which involved individuals with OUD and healthy controls, investigated impulsivity and BPD signs as risk factors for suicide attempts. Impulsivity and BPD rates were significantly higher in those with OUD compared to controls.

However, the study found that impulsivity and borderline personality traits were important risk factors for suicide attempt regardless of OUD presence.<sup>49</sup> AUD patients with a history of suicidal ideation were reported to have higher overall impulsivity scores. However, no similar relationship was found in HSA patients.<sup>50</sup>

According to our results, comorbid BPD diagnosis is indirectly associated with HSA. We found that 50% of those with HSA had an accompanying diagnosis of BPD and showed significantly higher rates compared to those without HSA. This finding is consistent with previous studies. In one study investigating suicide attempts in individuals with comorbid BPD and OUD, BPD was found to accompany substance use at a rate of 46% and to be associated with suicide.<sup>51</sup> Studies involving patients with BPD show that impulsivity is a key factor in diagnosis.<sup>25</sup> These individuals

**Table 4.** Determinants of Life-Long Suicide Attempt in a Logistic Regression Model

		B	SE	Wald	<i>df</i>	<i>P</i>	Odds Ratio	95% CI	
								Lower	Upper
Step 1	BPD	-1.435	0.399	12.915	1	<.001	0.238	0.109	0.521
Step 2	BPD	-1.043	0.429	5.913	1	.015	0.352	0.152	0.817
	Anger	0.093	0.035	7.208	1	.007	1.097	1.025	1.174
Step 3	BPD	-0.913	0.442	4.255	1	.039	0.401	0.169	0.956
	Anger	0.097	0.037	6.988	1	.008	1.101	1.025	1.183
	NPI	0.176	0.062	8.170	1	.004	1.193	1.057	1.346
Step 4	BPD	-0.690	0.460	2.255	1	.133	0.501	0.204	1.234
	Anger	0.071	0.039	3.399	1	.065	1.074	0.996	1.158
	NPI	0.191	0.064	8.955	1	.003	1.210	1.068	1.372
	SMB	-1.013	0.495	4.186	1	.041	0.363	0.138	0.958

Nagelkerke *R*<sup>2</sup>: Step 1 = 0.134, Step 2 = 0.204, Step 3 = 0.284, and Step 4 = 0.317.

SE, standard error; SMB, self-mutilative behavior; BPD, bipolar personality disorder; NPI, non-planning impulsivity.

are more impulsive and clinically less stable than BPD patients without SUD.<sup>52</sup> More impulsive behaviors were reported for patients with HSA compared to those without HSA.<sup>53</sup> Aggression is another basic trait of BPD and it is typically reactive. Reactive aggression is often triggered by threats, frustration, or provocation, and it is strongly associated with negative emotions, anger in particular.<sup>54</sup> In addition, BPD is more common in those with a history of SMB,<sup>55</sup> and the severity of borderline personality traits is a strong predictor of SMB.<sup>56</sup> In a prospective study including patients with BPD, SUD and SMB were found to be among the predictors of HSA.<sup>57</sup> Although BPD and HSA are associated, according to our findings SMB is a strong mediator in this relationship. Anger and non-planning impulsivity play a partially mediating role in the relationship between BPD and HSA. Therefore, SMB, anger, and impulsivity stand out as common traits in both SUD and BPD and appear to be important factors in suicidal behavior among patients with SUD.

The term impulsivity refers to a large number of dissonant behaviors which are seemingly unrelated, such as inability to wait, difficulty in responding, and insensitivity to negative or delayed outcomes. Impulsivity can function both as a predictor and an outcome of substance use.<sup>58</sup> Most studies on impulsivity find higher levels of impulsivity in substance-dependent individuals than in healthy controls.<sup>38,59,60</sup> Momentary delays in control or inhibition may increase the risk of substance use in impulsive individuals.<sup>58</sup> It has also been hypothesized that impulsivity facilitates the transition from suicidal ideation to suicide attempt.<sup>61</sup> Impulsivity has been identified as a risk factor for substance use and suicide as well as for SMB.<sup>29</sup> Impulsivity can lead to a failure of high-order control, including decision-making, and therefore, risky choices such as SMB or suicidal behavior.<sup>62</sup> In our study, impulsivity was particularly associated with the non-planning impulsivity factor of the BIS-11. Partially consistent with the results of our study, researchers found significantly higher scores of non-planning impulsivity and motor impulsivity in AUD patients with a history of suicidal ideation.<sup>50</sup> Non-planning impulsivity is associated with being focused on the moment and acting without thinking about the future.<sup>38</sup> These findings suggest that impulsivity is important for understanding both self-mutilative and suicidal tendencies and that this relationship can vary depending on levels of suicidal ideation and behavior.

Aggression is considered a distal risk factor for suicidal behavior in patients with SUD.<sup>63</sup> Distal risk factors (mental, psychological, personality-related, biological, genetic, and social variables) affect the suicide threshold and proximal risk factors (life events, stress, acute episodes of mental illness, and acute alcohol or substance abuse), which are triggering factors more closely associated with suicidal behavior, indirectly increase an individual's risk of suicide when they experience such proximal risk factors.<sup>64</sup> It has

been repeatedly shown that aggression in individuals with SUD is strongly associated with suicidal behavior.<sup>27,65,66</sup> In our study, the anger factor of BPAQ stood out as the factor that predicts HSA. A recent study has shown that individuals with SUD score the highest in the anger sub-dimension of aggression.<sup>67</sup> Buss and Perry<sup>20</sup> define anger as a component of aggression, a feeling that arises naturally biologically from the limbic system, and especially from the hypothalamus and amygdala, which each individual experiences in their everyday life. State anger is closely associated with aggression in intoxicated men who report low anger control.<sup>68</sup> A person experiencing state anger is more likely to exhibit problems with physical aggression and violence, SUD, and SMB.

In parallel with previous studies,<sup>64,69,70</sup> 39.4% of the participants reported having attempted suicide at least once in their lifetime. Also consistent with studies involving those with AUD<sup>71</sup> and OUD,<sup>72</sup> suicide attempt was more common among younger individuals. In a recent study, early onset of AUD was found to be associated with an increased risk of suicide.<sup>73</sup> The data indicate that suicidal behavior is common among substance users. Therefore, early prevention and intervention efforts for SUD can be effective in controlling suicide risk.

This study has certain limitations. First, all analyses are cross-sectional, and measurements of suicidal behavior rely on self-report. These measurements are likely to be influenced by recall bias. Moreover, although we conducted the study after detoxification, patients may still have experienced some cognitive problems that impair their ability to accurately evaluate themselves. The second limitation is that our sample was made up of only male patients and no overall assessment could be made. Third, the psychopathological factors which we investigated often show comorbidity with attention-deficit/hyperactivity, difficulty with impulse control, and behavioral disorders. This was not treated as a limitation in the exclusion criteria. Another limitation is that factors such as depression, anxiety, and childhood trauma, which can be considered as confounding factors were not evaluated. On the other hand, we evaluated many psychopathological factors associated with suicidal behavior among individuals with substance use, which is one of the strengths of our study. Our study may pave the way for prospective studies with larger sample sizes.

Our results show that there are multiple risk factors for suicidal behavior in this population. Anger, non-planning impulsivity, and SMB may be a warning for future suicide attempts along with BPD in patients with SUD. Our results, therefore, highlight the importance of routine assessment of SMB, anger, and impulsivity in patients with SUD, particularly if these are accompanied by BPD. It is important to interpret SMB as a strong sign of suicide risk. Addiction treatment providers should routinely collect information about suicide history, thoughts, and plans of

patients in order to assess the risk of suicide at various points of the treatment duration and develop therapeutic plans for suicidal tendencies. Additionally, therapies that focus on anger and impulsivity management strategies may reduce the likelihood of future suicide attempts, particularly among those with BPD.

**Ethics Committee Approval:** Ethical committee approval was received from the Bakirkoy Dr. Sadi Konuk Training and Research Hospital (2021-02-17).

**Informed Consent:** Written informed consent was obtained from all participants who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - V.K., C.E., İ.A.; Design - V.K., C.E., İ.A., G.U., H.Y.C.; Supervision - C.E., G.U.; Resource - ; Materials - ; Data Collection and/or Processing - V.K., İ.A., O.H.C., G.U., T.C.; Analysis and/or Interpretation - V.K., C.E., İ.A., O.H.C., G.U., T.C., H.Y.C; Literature Search - V.K., C.E., İ.A., O.H.C., G.U., T.C., H.Y.C; Writing - V.K., C.E., İ.A.; Critical Reviews - O.H.C., G.U., T.C., H.Y.C.

**Conflict of Interest:** No potential conflict of interest was reported by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

## REFERENCES

- Poorolajal J, Haghtalab T, Farhadi M, Darvishi N. Substance use disorder and risk of suicidal ideation, suicide attempt and suicide death: a meta-analysis. *J Public Health (Oxf)*. 2016;38(3):e282-e291. [CrossRef]
- Yuodelis-Flores C, Ries RK. Addiction and suicide: a review. *Am J Addict*. 2015;24(2):98-104. [CrossRef]
- Rontziokos H, Deane F. Systematic review of suicidal behaviour in individuals who have attended substance abuse treatment. *Int J Ment Health Addict*. 2019;17(6):1580-1598. [CrossRef]
- Esang M, Ahmed S. A closer look at substance use and suicide. *Am J Psychiatry Resid J*. 2018;13(6):6-8. [CrossRef]
- Ilgen MA, Conner KR, Valenstein M, Austin K, Blow FC. Violent and nonviolent suicide in veterans with substance use disorders. *J Stud Alcohol Drugs*. 2010;71(4):473-479. [CrossRef]
- Mahfoud Y, Ignatowski M. Substance abuse and suicide. In: Falcone T, Timmons-Mitchell J, eds. *Suicide Prevention*. Cham: Springer International Publishing; 2018:109-118. [CrossRef]
- Rodríguez-Cintas L, Daigre C, Braquehais MD, et al. Factors associated with lifetime suicidal ideation and suicide attempts in outpatients with substance use disorders. *Psychiatry Res*. 2018;262:440-445. [CrossRef]
- Sansone RA, Phillip Whitecar MD, Wiederman MW. The prevalence of borderline personality among buprenorphine patients. *Int J Psychiatry Med*. 2008;38(2):217-226. [CrossRef]
- Victor SE, Klonsky ED. Correlates of suicide attempts among self-injurers: a meta-analysis. *Clin Psychol Rev*. 2014;34(4):282-297. [CrossRef]
- Bolton JM, Pagura J, Enns MW, Grant B, Sareen J. A population-based longitudinal study of risk factors for suicide attempts in major depressive disorder. *J Psychiatr Res*. 2010;44(13):817-826. [CrossRef]
- Bachmann S. Epidemiology of suicide and the psychiatric perspective. *Int J Environ Res Public Health*. 2018;15(7):1425. [CrossRef]
- Lieb K, Zanarini MC, Schmahl C, Linehan MM, Bohus M. Borderline personality disorder. *Lancet*. 2004;364(9432):453-461. [CrossRef]
- New AS, Barbara S. An opioid deficit in borderline personality disorder: self-cutting, substance abuse, and social dysfunction. *Am J Psychiatry*. 2010;167(8):882-885. [CrossRef]
- Nock MK. Self injury. *Annu Rev Clin Psychol*. 2010;6:339-363. [CrossRef]
- Oumaya M, Friedman S, Pham A, et al. Borderline personality disorder, self-mutilation and suicide: literature review. *Encephale*. 2008;34(5):452-458. [CrossRef]
- Mann JJ, Arango VA, Avenevoli S, et al. Candidate endophenotypes for genetic studies of suicidal behavior. *Biol Psychiatry*. 2009;65(7):556-563. [CrossRef]
- Giegling I, Olgiati P, Hartmann AM, et al. Personality and attempted suicide. Analysis of anger, aggression and impulsivity. *J Psychiatr Res*. 2009;43(16):1262-1271. [CrossRef]
- Rimkeviciene J, O’Gorman J, De Leo D. Impulsive suicide attempts: a systematic literature review of definitions, characteristics and risk factors. *J Affect Disord*. 2015;171:93-104. [CrossRef]
- Gvion Y, Apter A. Aggression, impulsivity, and suicide behavior: a review of the literature. *Arch Suicide Res*. 2011;15(2):93-112. [CrossRef]
- Buss AH, Perry M. The aggression questionnaire. *J Pers Soc Psychol*. 1992;63(3):452-459. [CrossRef]
- Deffenbacher JL, Oetting ER, Thwaites GA, et al. State-trait anger theory and the utility of the trait anger scale. *J Couns Psychol*. 1996;43(2):131-148. [CrossRef]
- Tiet QQ, Ilgen MA, Byrnes HF, Moos RH. Suicide attempts among substance use disorder patients: an initial step toward a decision tree for suicide management. *Alcohol Clin Exp Res*. 2006;30(6):998-1005. [CrossRef]
- Anestis MD, Soberay KA, Gutierrez PM, Hernández TD, Joiner TE. Reconsidering the link between impulsivity and suicidal behavior. *Pers Soc Psychol Rev*. 2014;18(4):366-386. [CrossRef]
- Ho MY, Mobini S, Chiang TJ, Bradshaw CM, Szabadi E. Theory and method in the quantitative analysis of “impulsive choice” behaviour: implications for psychopharmacology. *Psychopharmacology*. 1999;146(4):362-372. [CrossRef]
- Moeller FG, Barratt ES, Dougherty DM, Schmitz JM, Swann AC. Psychiatric aspects of impulsivity. *Am J Psychiatry*. 2001;158(11):1783-1793. [CrossRef]
- Cyders MA, Smith GT. Emotion-based dispositions to rash action: positive and negative urgency. *Psychol Bull*. 2008;134(6):807-828. [CrossRef]

27. Sher L. Alcohol consumption and suicide. *QJM An Int J Med.* 2006;99(1):57-61. [CrossRef]
28. Bozkurt M, Evren C, Yilmaz A, Can Y, Cetingok S. Aggression and impulsivity in different groups of alcohol and heroin dependent inpatient men. *Psychiatry Clin Psychopharmacol.* 2013;23(4):335-344. [CrossRef]
29. Hamza CA, Willoughby T, Heffer T. Impulsivity and nonsuicidal self-injury: a review and meta-analysis. *Clin Psychol Rev.* 2015;38:13-24. [CrossRef]
30. Koller G, Preuss UW, Bottlender M, Wenzel K, Soyka M. Impulsivity and aggression as predictors of suicide attempts in alcoholics. *Eur Arch Psychiatry Clin Neurosci.* 2002;252(4):155-160. [CrossRef]
31. Sung K, Kwon YS, Hyun MH. The associations between aggression, acquired capability for suicide and suicidal behavior in male alcohol use disorders. *koreanjournalofhealthpsychology.* 2015;20(1):253-265. [CrossRef]
32. Anestis MD, Selby EA, Joiner TE. The role of urgency in maladaptive behaviors. *Behav Res Ther.* 2007;45(12):3018-3029. [CrossRef]
33. Conner KR. A call for research on planned vs. unplanned suicidal behavior. *Suicide Life Threat Behav.* 2004;34(2):89-98. [CrossRef]
34. World Medical Association. WMA Declaration of Helsinki: ethical principles for medical research involving human subjects [internet]; 2013. Available at: <https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>. Accessed Jul 08, 2020.
35. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders.* 5th ed.; DSM-5. Arlington, VA: American Psychiatric Association Publishing; 2013.
36. Spitzer R, Williams J, Gibbon M, First M. *Users Guide for the Structured Clinical Interview for DSM-III-R.* Washington, DC: American Psychiatric Association Publishing; 1990.
37. Sorias S, Saygılı R, Elbi H. *DSM-III-R Structured Clinical Interview Turkish Version SCID-II Personality Disorders Form.* Bornova İzmir: Ege University Printery; 1990. [Turkish].
38. Patton JH, Stanford MS, Barratt ES. Factor structure of the Barratt impulsiveness scale. *J Clin Psychol.* 1995;51(6):768-774. [CrossRef]
39. Gulec H, Tamam L, Gulec MY, et al. Psychometric properties of the Turkish version of the Barratt impulsiveness scale-11. *Klinik Psikofarmakoloji Bulteni: Psychiatry Clin Psychopharmacol.* 2008;18(4):251-258.
40. Spinella M. Normative data and a short form of the Barratt impulsiveness scale. *Int J Neurosci.* 2007;117(3):359-368. [CrossRef]
41. Tamam L, Gulec H, Karatas G. Short form of Barratt impulsiveness scale (BIS-11-SF) Turkish adaptation study. *Nöropsikiyatri Arşivi: Arch Neurol Psychiatry.* 2013;50(2):130-134. [Turkish].
42. Madran H. The reliability and validity of the Buss-Perry Aggression Questionnaire (BAQ)-Turkish version. *Türk Psikiyatri Dergisi: Turk J Psychiatry.* 2013;24(2):124-129. [Turkish].
43. Evren C, Çınar Ö, Gülec H, Çelik S, Evren B. The validity and reliability of the Turkish version of the Buss-Perry's aggression questionnaire in male substance dependent inpatients/Buss-Perry Agresyon Ölçeği Türkçe versiyonunun yatarak tedavi gören erkek alkol/madde bağımlılarında geçerliği ve güvenilirliği. *Dusunen Adam.* 2011;24(4):283-295. [CrossRef]
44. Coşkunol H, Bağdiken İ, Sorias S, Saygılı R. Reliability of SCID-II (Turkish version) interview in personality disorders. *Türk Psikoloji Dergisi: Turk J Psychology.* 1994;9(32):26-29. [Turkish].
45. Evren C, Cınar O, Evren B, Celik S. History of suicide attempt in male substance-dependent inpatients and relationship to borderline personality features, anger, hostility and aggression. *Psychiatry Res.* 2011;190(1):126-131. [CrossRef]
46. Sher L, Oquendo MA, Galfalvy HC, et al. The relationship of aggression to suicidal behavior in depressed patients with a history of alcoholism. *Addict Behav.* 2005;30(6):1144-1153. [CrossRef]
47. Sharma MK, Salim A. Suicidal behavior among alcohol dependents: relationship with anger and personality dimensions. *Ind Psychiatry J.* 2014;23(1):61-64. [CrossRef]
48. Costanza A, Rothen S, Achab S, et al. Impulsivity and impulsivity-related endophenotypes in suicidal patients with substance use disorders: an exploratory study. *Int J Ment Health Addiction.* 2020 March 19. <https://doi.org/10.1007/s11469-020-00259-3>. [Epub ahead of print].
49. Maloney E, Degenhardt L, Darke S, Nelson EC. Impulsivity and borderline personality as risk factors for suicide attempts among opioid-dependent individuals. *Psychiatry Res.* 2009;169(1):16-21. [CrossRef]
50. Khemiri L, Jokinen J, Runeson B, Jayaram-Lindström N. Suicide risk associated with experience of violence and impulsivity in alcohol dependent patients. *Sci Rep.* 2016;6(1):1-11. [CrossRef]
51. Darke S, Williamson A, Ross J, Teesson M, Lynskey M. Borderline personality disorder, antisocial personality disorder and risk-taking among heroin users: findings from the Australian Treatment Outcome Study (ATOS). *Drug Alcohol Depend.* 2004;74(1):77-83. [CrossRef]
52. Kienast T, Stoffers J, BERPohl F, Lieb K. Borderline personality disorder and comorbid addiction: epidemiology and treatment. *Dtsch Arztebl Int.* 2014;111(16):280-286. [CrossRef]
53. Soloff PH, Lis JA, Kelly T, Cornelius J, Ulrich R. Risk factors for suicidal behavior in borderline personality disorder. *Am J Psychiatry.* 1994;151(9):1316-1323. [CrossRef]
54. Mancke F, Herpertz SC, Bertsch K. Aggression in borderline personality disorder: a multidimensional model. *Personal Disord Theor Res Treat.* 2015;6(3):278-291. [CrossRef]
55. Evren C, Karabulut V, Alniak I, et al. Relationship between self-mutilative behaviour and novelty seeking, the presence of antisocial and borderline personality disorders, and severity of psychopathology in a sample of male patients with heroin use disorder. *Heroin Addict Relat Clin Probl.* 2018;20(3):25-32.
56. Evren C, Cınar O, Evren B, Celik S. Relationship of self-mutilative behaviours with severity of borderline personality, childhood trauma and impulsivity in male



- substance-dependent inpatients. *Psychiatry Res.* 2012;200(1):20-25. [\[CrossRef\]](#)
57. Wedig MM, Silverman MH, Frankenburg FR, et al. Predictors of suicide attempts in patients with borderline personality disorder over 16 years of prospective follow-up. *Psychol Med.* 2012;42(11):2395-2404. [\[CrossRef\]](#)
  58. De Wit H. Impulsivity as a determinant and consequence of drug use: a review of underlying processes. *Addict Biol.* 2009;14(1):22-31. [\[CrossRef\]](#)
  59. Allen TJ, Moeller FG, Rhoades HM, Cherek DR. Impulsivity and history of drug dependence. *Drug Alcohol Depend.* 1998;50(2):137-145. [\[CrossRef\]](#)
  60. Evren C, Bozkurt M. Impulsivity and opioid use disorder. [Düşünen adam Psikiyatri ve Nörolojik bilimler]. *Dusunen Adam.* 2017;30(2):75-78. [\[CrossRef\]](#)
  61. Klonsky ED, May A. Rethinking impulsivity in suicide. *Suicide Life Threat Behav.* 2010;40(6):612-619. [\[CrossRef\]](#)
  62. Gvion Y, Levi-Belz Y, Hadlaczky G, Apter A. On the role of impulsivity and decision-making in suicidal behavior. *World J Psychiatry.* 2015;5(3):255-259. [\[CrossRef\]](#)
  63. Roy A. Distal risk factors for suicidal behavior in alcoholics: replications and new findings. *J Affect Disord.* 2003;77(3):267-271. [\[CrossRef\]](#)
  64. Roy A, Janal MN. Risk factors for suicide attempts among alcohol dependent patients. *Arch Suicide Res.* 2007;11(2):211-217. [\[CrossRef\]](#)
  65. Modesto-Lowe V, Brooks D, Ghani M. Alcohol dependence and suicidal behavior: from research to clinical challenges. *Harv Rev Psychiatry.* 2006;14(5):241-248. [\[CrossRef\]](#)
  66. Cuomo C, Sarchiapone M, Di Giannantonio MD, Mancini M, Roy A. Aggression, impulsivity, personality traits, and childhood trauma of prisoners with substance abuse and addiction. *Am J Drug Alcohol Abuse.* 2008;34(3):339-345. [\[CrossRef\]](#)
  67. Köksal B, Karaca S, Çitak S. Examination of impulsiveness and aggression in substance abuse. *Klinik Psikiyatri Dergisi: J Clin Psychiatry.* 2020;23(1):23-33. [Turkish]. [\[CrossRef\]](#)
  68. Parrott DJ, Giancola PR. A further examination of the relation between trait anger and alcohol-related aggression: the role of anger control. *Alcohol Clin Exp Res.* 2004;28(6):855-864. [\[CrossRef\]](#)
  69. Karabulut V, Evren C. The relationship of suicide attempt story and stress coping style among the patients with opioid substitution therapy. *Klinik Psikiyatri Dergisi: J Clin Psychiatry.* 2018;21(3):245-253. [Turkish]. [\[CrossRef\]](#)
  70. López-Goñi JJ, Fernández-Montalvo J, Arteaga A, Haro B. Suicidal attempts among patients with substance use disorders who present with suicidal ideation. *Addict Behav.* 2019;89:5-9. [\[CrossRef\]](#)
  71. Wojnar M, Ilgen MA, Czyz E, et al. Impulsive and non-impulsive suicide attempts in patients treated for alcohol dependence. *J Affect Disord.* 2009;115(1-2):131-139. [\[CrossRef\]](#)
  72. Roy A. Risk factors for attempting suicide in heroin addicts. *Suicide Life Threat Behav.* 2010;40(4):416-420. [\[CrossRef\]](#)
  73. Edwards AC, Ohlsson H, Sundquist J, Sundquist K, Kendler KS. Alcohol use disorder and risk of suicide in a Swedish population-based cohort. *Am J Psychiatry.* 2020;177(7):627-634. [\[CrossRef\]](#)