

SUICIDE ATTEMPTS ARE ASSOCIATED WITH PERSONALITY DIMENSIONS IN CROATIAN WAR VETERANS WITH POSTTRAUMATIC STRESS DISORDER

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Summary

Background: Patients with combat-related posttraumatic stress disorder (PTSD) have an increased frequency of suicide ideations, but also a higher risk of suicide attempts. Of all the known predisposing risk factors of suicide attempts in this population, personality dimensions are one of the least investigated. The main aim of this study was to examine if personality traits, namely temperament and character dimensions and trait impulsivity, are associated with suicide attempts in war veterans with PTSD.

Subjects and methods: This sample included 178 Croatian male war veterans (mean age 49.20 years) treated for PTSD at the Department of Psychiatry and Psychological Medicine, University Hospital Center Zagreb. These patients were assessed with the M.I.N.I. diagnostic interview and they filled out several self-report scales: the Beck Depression Inventory-Second Edition (BDI-II), the Temperament and Character Inventory-Revised (TCI-R), the Barratt Impulsiveness Scale-11 (BIS-11), and the Satisfaction with Life Scale (SWLS).

Results: It was found that 42 (24%) Croatian war veterans with PTSD had a previous suicide attempt. Comparison between the two groups (participants with vs. those without history of suicide attempts) revealed that patients with previous suicide attempts are less educated and more often unemployed, have a longer duration of psychiatric treatment and more psychiatric hospitalizations, and exhibit higher levels of depression and lower life satisfaction. In multivariate logistic regression analyses, temperament dimension Harm Avoidance and character dimension Self-transcendence were unique predictors of suicide attempts, above the influence of age, education level and length of treatment.

Conclusions: Croatian war veterans with PTSD have a substantial risk of suicide attempts. In addition to the role of some sociodemographic and clinical factors, it seems that certain personality dimensions are uniquely associated with suicide behaviours among these individuals.

Keywords: personality, temperament, character, suicide, war veterans, PTSD

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INTRODUCTION

War veterans with posttraumatic stress disorder (PTSD) are at a particularly high risk of suicidality, including actual suicide behaviours and attempts (Kerr et al. 2018, Rauch et al. 2022), a finding that was corroborated by a recent systematic review of studies conducted with active and retired military personnel (Holliday et al. 2020). The strong relationship between combat PTSD and increased suicide risk is illustrated in the fact this association remains even after controlling for the influence of psychiatric comorbidity (Ramsawh et al. 2014). In case of the Croatian Homeland War that ended in 1995, one needs to be aware of possible longterm PTSD and elevated suicidality among the war veterans, even years after combat activities had ended (Loncar et al. 2014, Jukic et al. 2019, Cvitanusic et al. 2022, Vilibic et al. 2022). For example, one study among US military veterans has found an increased

suicide risk almost 25 years post-deployment (Price et al. 2004), including veterans who had received psychological/psychiatric treatment (Rosenheck & Fontana 2001).

Furthermore, existing literature in this field describes various possible predisposing risk factors for increased risk of suicidal behaviours among military personnel and war veterans, such as genetic and neurobiological vulnerability, childhood trauma, socioeconomic status, inadequate coping mechanisms, combat exposure, physical injuries, post-deployment social support, and psychiatric disorders (Jakovljevic et al. 2012a,b, Pompili et al. 2015, Ursano et al. 2016, Lee et al. 2018, Forehand et al. 2022). Psychiatric comorbidity, particularly co-existing PTSD and depressive disorder, is a particularly significant risk factor for suicidal tendencies in this vulnerable population (Kimbrel et al. 2016, Jaksic et al. 2017), whereas some potential risk factors, such as combat exposure and minority status, are less consistent (Bryan et al. 2013, Kimbrel et

al. 2016). In addition to this, personality traits are also conceptualized as possible predisposing risk factors for suicidal tendencies among military and veteran populations (Nock et al. 2013, Pompili et al. 2015). Given that direct assessment of suicidal risk often yields inaccurate findings, primarily due to the known fear of social stigma and feelings of inadequacy in this particular population (Sher et al. 2012, Denneson et al. 2015), indirect risk factors – personality dimensions – could facilitate more successful prevention of this unwanted outcome. Personality traits, including Cloninger’s temperament and character dimensions (Cloninger et al. 1993), and trait impulsivity, are mostly congruent with the increasingly popular endophenotype approach to suicidality (Giner et al. 2016). Although previous studies have documented associations between personality dimensions and suicidality in various psychiatric populations (e.g., Aukst Margetić et al. 2012), only a handful of such studies have been carried out with war veterans (mostly related to suicide ideation but not attempts) (e.g., Jaksic et al. 2017). For example, Soltaninejad et al. (2014) have found trait neuroticism to be related to suicide ideation among active Iranian military personnel, while Na et al. (2013) have shown an association between character dimension Cooperativeness and suicide attempts in a sample of untreated Korean soldiers who were not assessed for the presence of PTSD.

To our knowledge, there is a lack of studies on the relationship between Cloninger’s temperament and character dimensions, as well as trait impulsivity, and suicide attempts in war veterans suffering from PTSD. Given the role of these personality dimensions as potential stable markers – endophenotypes – of suicide behaviours, this research could help improve early identification of increased suicidal risk in this vulnerable population.

SUBJECTS AND METHODS

Procedure and participants

We recruited a sample of 178 Caucasian male outpatients treated at the Department of Psychiatry and Psychological Medicine, University Hospital Center Zagreb, between 2014 and 2016. They were war veterans who actively participated in the Croatian Homeland War (1991-1995) and were all diagnosed with combat-related PTSD, which was confirmed by the Mini International Neuropsychiatric Interview, Version 5.0.0 (M.I.N.I.) (Sheehan et al. 1998). For the study purposes, these patients were approached by their psychiatrist or clinical psychologist, and those who were willing to take part in this study were assessed via a diagnostic interview. In

addition, they filled out a battery of self-report measures, while waiting for their appointments, after the appointments had ended, or at home. While 21 patients refused to participate, no differences in age and education level between these patients and those taking part in this study were observed.

Comorbid psychiatric diagnoses were also established using the M.I.N.I., with 57 (32%) of the war veterans also meeting diagnostic criteria for current major depressive disorder (MDD) or having a lifetime diagnosis of MDD based on their medical records and thorough unstructured clinical interviews. Exclusion criteria were lifetime history of schizophrenia, schizoaffective, or bipolar disorder, significant cognitive impairment, recent alcohol or drug abuse, low comprehension skills, and a history of psychiatric treatment before the War. Written informed consent was obtained after the aim of the study was thoroughly explained. This research was approved by the institution’s ethics committee.

Patients’ sociodemographic and clinical characteristics are shown in Table 1.

Table 1. Sociodemographic and clinical characteristics of the patients (N=178)

	M	SD	range
Age (years)	49.20	6.730	36-64
Duration of psychiatric treatment (months)	76.93	80.628	1-240
Number of psychiatric hospitalizations	1.01	1.327	0-5
Education level			
Elementary school	12 (7%)		
High-school	130 (73%)		
University degree	36 (20%)		
Employment status			
Employed	103 (58%)		
Unemployed	35 (20%)		
Retired	40 (22%)		

M = arithmetic mean; SD = standard deviation

Assessment measures

The Temperament and Character Inventory-Revised (TCI-R) (Cloninger 1999) is a self-report instrument that assesses 4 temperament (Novelty seeking (NS), Harm avoidance (HA), Reward dependence (RD), and Persistence (PS)) and 3 character dimensions (Selfdirectedness (SD), Cooperativeness (CO), and Selftranscendence (ST)) within the Cloninger’s Psychobiological Model of Personality (Cloninger et al. 1993). It comprises 240

items rated on a 5-point Likert scale, ranging from 1 (*definitely false*) to 5 (*definitely true*). The Croatian adaptation of the TCI-R yielded adequate psychometric properties in a large sample of psychiatric outpatients (Jaksic et al. 2015). In the present study, Cronbach's alpha coefficients for the seven scales ranged from 0.72 to 0.90.

The Barratt Impulsiveness Scale-11 (BIS-11) (Patton et al. 1995) is a self-report instrument developed to assess the personality/behavioral construct of impulsivity. It consists of 30 items that are scored on a 4 – point scale from 1 (rarely/never) to 4 (almost always/ always). The questionnaire contains three subscales (Attentional Impulsiveness, Motor Impulsiveness, and Non-planning Impulsiveness) that can be summed into a global impulsiveness score. In the present study, Cronbach's alpha coefficient was 0.83.

The Beck Depression Inventory-Second Edition (BDII) (Beck et al. 1996) is a self-report measure of the severity of depressive symptoms. It contains 21 items rated on a 4-point scale. The BDI-II has been validated in a Croatian clinical sample (Jaksic et al. 2013). In the current study, Cronbach's alpha coefficient was 0.94.

The Satisfaction with Life Scale (SWLS) (Diener et al. 1985) is a five-item self-report instrument designed to measure global cognitive judgments of one's life satisfaction (i.e., subjective well-being). Total score ranges from 5 to 25, with a score of 15 representing a neutral point on the scale (i.e., scores lower than 15 indicate general dissatisfaction with life). In this study, Cronbach's alpha coefficient was 0.87.

Sociodemographic and clinical sheet included age, education level, employment status, psychiatric treatment duration, number of psychiatric hospitalizations, and previous suicide attempt(s).

Statistical analysis

We performed all the data analyses by using the SPSS version 19.0 (SPSS, Chicago, IL). Descriptive analysis included percentages, ranges, means (M) and standard deviations (SD). Internal reliabilities of the self-report measures were described by Cronbach's alpha coefficients. We compared the two clinical subgroups (with vs. without suicide attempt) with regard to sociodemographic and clinical data by using the t-test or chi-square test. Three multivariate logistic regression analyses were performed to examine whether temperament and character dimensions, and trait impulsivity, were independent predictors of previous suicide attempts. To control for the influence of age, education level and length of psychiatric treatment, these variables were entered in the same block together with the personality factors. We defined the level of statistical significance as $P < 0.05$.

RESULTS

It was found that 42 (24%) patients had a previous suicide attempt. The comparison between the two clinical subgroups (with vs. without suicide attempt) with regard to sociodemographic (age, education level, employment status) and clinical variables (length of psychiatric treatment, number of psychiatric hospitalizations, depression level, and life satisfaction) is shown in Table 2. Patients with a previous suicide attempt were significantly less educated, more often currently unemployed, were being treated for a longer time with higher number of psychiatric hospitalizations, had more intense depressive symptoms (BDI-2 score), and a lower life satisfaction (SWLS score) ($P < 0.05$).

Table 2. Comparison between patients without and those with previous suicide attempt with regard to sociodemographic and clinical variables

	Mean (SD)		t-test/ χ^2 test	P
	Patients without suicide attempt (n=136)	Patients with suicide attempt (n=42)		
Age (years)	48.73 (6.776)	49.98 (6.569)	-1.051	.295
Education level	-	-	6.081	.048
Employment status	-	-	22.705	.000
Length of treatment (months)	62.68 (73.120)	121.07 (87.541)	-4.231	.000
Psychiatric hospitalizations	0.81 (1.272)	1.58 (1.384)	-2.976	.003
BDI-2 total score	20.82 (12.950)	33.38 (14.074)	-5.240	.000
SWLS score	13.09 (4.680)	9.26 (3.898)	4.659	.000

BDI-2 = Beck Depression Inventory-2nd Edition; SWLS = Satisfaction with Life Scale; χ^2 test = chi-square test; Significant P values are shown in italic

Table 3. Three multivariate logistic regression analyses in predicting suicide attempt with temperament dimensions (Regression 1), character dimensions (Regression 2), and trait impulsivity (Regression 3), adjusted for age, education level and length of psychiatric treatment (N=178)

	Nagelkerke R ²	B (S.E.)	Wald test	P
Regression 1	0.238			
Age		0.051 (0.033)	2.394	0.122
Education level		-0.755 (0.490)	2.376	0.123
Length of treatment		0.008 (0.002)	10.768	<i>0.001</i>
Novelty Seeking		0.030 (0.017)	3.655	0.054
Harm Avoidance		0.027 (0.013)	4.487	<i>0.034</i>
Reward Dependence		0.003 (0.014)	0.040	0.842
Persistence		0.011 (0.012)	0.818	0.366
Regression 2	0.219			
Age		0.034 (0.034)	0.969	0.325
Education level		-1.133 (0.495)	5.232	<i>0.022</i>
Length of treatment		0.008 (0.002)	10.312	<i>0.001</i>
Self-Directedness		0.020 (0.012)	2.976	0.084
Cooperativeness		-0.018 (0.012)	2.240	0.135
Self-Transcendence		0.036 (0.016)	5.156	<i>0.023</i>
Regression 3	0.215			
Age		0.040 (0.033)	1.469	0.226
Education level		-0.868 (0.457)	3.610	0.057
Length of treatment		0.010 (0.002)	15.685	<i>0.000</i>
Trait impulsivity		0.016 (0.020)	0.613	0.434

Significant P values are shown in italic

We examined if personality dimensions were predictors of previous suicide attempts. Three multivariate logistic regression analyses with suicide attempt as a dependent variable and temperament dimensions, character dimensions, and trait impulsivity, respectively, as predictor variables, were carried out. Age, education level and length of treatment were controlled for (Table 3). The first logistic regression analysis revealed a significant overall model (Nagelkerke R²=24%), with length of psychiatric treatment (Wald $\chi^2=10.768$, p=0.001) and temperament dimension Harm Avoidance (Wald $\chi^2=4.487$, p=0.034) exhibiting unique contributions in predicting suicide attempt. In the second logistic regression analysis, the overall model was also significant (Nagelkerke R²=22%). In addition to education level (Wald $\chi^2=5.232$, p=0.022) and length of psychiatric treatment (Wald $\chi^2=10.312$, p=0.001), character dimension Self-transcendence (Wald $\chi^2=5.156$, p=0.023) was also a unique predictor of suicide attempt. Finally, the third logistic regression analysis revealed a significant overall model (Nagelkerke R²=22%). Here, length of psychiatric treatment (Wald $\chi^2=15.685$, p=0.000) was significantly associated with

suicide attempt, whereas trait impulsivity (Wald $\chi^2=0.613$, p=0.434) was not a unique predictor of suicide attempt in this model.

DISCUSSION

The main findings of this study revealed that a significant portion of Croatian war veterans with PTSD have previously attempted suicide. Temperament dimension Harm Avoidance and character dimension Selftranscendence were significant predictors of suicide attempts, beyond the influence of age, education level and length of psychiatric treatment.

In this research, 24% of Croatian war veterans with PTSD had a previous suicide attempt, an almost identical finding to other two domestic studies carried out in this population (Nađ et al. 2008, Šagud et al. 2018), despite the differences in sample characteristics. For example, patients in Šagud et al. (2018) were more than 5 years older, had almost twice as high retirement rate, and lower employment rate. Conversely, participants in Nađ et al.

(2008) were 7 years younger, but had similar proportion of employed participants. Those findings collectively suggest that different populations of Croatian war veterans had markedly similar rates of suicide attempts. Moreover, such high proportion is in line with Western data suggesting a rise in suicide behaviors among war veterans in the last 15 years, with higher suicide rates than in the general population (Reimann & Mazuchowski 2018). These suicide rates are particularly high among retired war veterans who were suffering from combat-related PTSD (Lee et al. 2018, Saulnier et al. 2022). For example, it was shown that retired veterans with military experience have a 68% increased risk of suicide attempts compared to those without direct combat experience (Holliday et al. 2020). This is particularly troubling given that symptoms of PTSD, as well as increased suicide risk in war veterans, can remain and even emerge years after the combat activities had ended (Horesh et al. 2013, Weber et al. 2022). Further, our findings contribute to the existing literature on risk and moderating factors associated with suicide risk in the veteran population. We have not found a significant difference in age between veterans who attempted suicide and those who did not, but suicide attempters differed in education level – they were less likely to have had obtained higher education level. This is only partly congruent with prior research suggesting these sociodemographic factors are not related to suicide attempts among the war veterans (Pompili et al. 2013, Kimbrel et al. 2016). Clinical factors, however, were more consistently associated with suicide attempts, in such way that suicide attempters had a longer treatment duration, more psychiatric hospitalizations, more severe depression symptoms, and worse life satisfaction. This is consistent with previous literature describing psychiatric symptoms and disorders, such as PTSD and depression, as one of the leading risk factors of suicide attempts in war veterans (Ursano et al. 2016, Lee et al. 2018, Forehand et al. 2022). It should be noted that our war veterans who had attempted suicide exhibited a mean BDI-2 score of 33, indicating high levels of depressive symptoms according to the original authors of this instrument (Beck et al. 1996), as well as low life satisfaction compared to the general population (Kobau et al. 2010).

We have also documented significant associations between certain personality dimensions and suicide attempts, which is a contribution to this field given the lack of such studies with war veterans, particularly from the perspective of the Cloninger's model of temperament and character. While controlling for the influence of some sociodemographic and clinical parameters in the regression analysis, temperament dimension Harm Avoidance was positively related to previous suicide attempts among the

Croatian war veterans. Previous research has shown an association between Harm Avoidance and trait neuroticism with suicide risk in patients with affective disorders (Jylha et al. 2016) and schizophrenia (Aukst Margetić et al. 2012). Among active Iranian military personnel, trait neuroticism was related to increased suicide risk, without examining actual suicide attempts (Soltaninejad et al. 2014). These findings, as well as our own, suggest that war veterans who are temperamentally more fearful, tense and anxious, prone to self-doubt and generally passive, have an increased risk of suicide behaviours. Although the scores on Harm Avoidance are partly dependent on acute psychiatric symptoms such as PTSD and depression, its increased levels were confirmed in euthymic-phase depression patients (Pelissolo & Corruble 2002). If one keeps in mind that Harm Avoidance, suicide behaviours and PTSD are all linked to serotonin neurotransmitter system dysfunction (van Heeringen 2003, Nedic Erjavec et al. 2020), the role of this temperament dimension in suicide risk among war veterans becomes even more apparent.

Character dimension Self-transcendence was also uniquely predictive of increased risk of suicide attempts in Croatian war veterans. Although the role of Self-transcendence in suicide risk is not as consistent, several authors have previously documented its relation to suicide risk in patients with affective disorders (Sarisoy et al. 2012, Woo et al. 2014) and schizophrenia (Aukst Margetić et al. 2012). Somewhat inconsistent findings are in part due to the fact that risk or protective role of Self-transcendence depends on simultaneous levels of other character dimensions (Jaksic & Aukst Margetić 2017). Although Self-transcendence is described as proneness to spirituality, creativity and interpersonal tolerance, it seems to become more dysfunctional when a person is also low on character dimensions Selfdirectedness and Cooperativeness, which is a somewhat common finding among individuals with PTSD (Jaksic et al. 2012). Such persons are described as being overly suspicious, prone to magical and paranoid thinking, showing signs of emotional immaturity and personality pathology (Svrakic & Cloninger 2012). Future research with larger samples should thus investigate multiple configurations of temperament and character dimensions within individuals, given their dynamic and often non-linear nature (Jaksic & Aukst Margetić 2017). In any event, it seems that previous findings on the role of Self-transcendence in suicidal phenomena might be extended to war veterans with PTSD. This is in accordance with many experts who conceptualize personality dimensions as endophenotypes – mediators of complex relationship between genetic vulnerability and suicide behaviours (Giner et al. 2016), and this seems to be the case with war affected individuals (Pompili et al. 2015).

The main limitation of the current study is the cross-sectional design, where causation cannot be explicitly demonstrated. However, various previous research has confirmed strong prospective associations between personality traits and suicide risk in psychiatric populations. In addition, some authors have stressed out the need for more thorough examination of post-war social and political circumstances where veterans' feelings of disappointment, frustration and injustice, sometimes referred to as posttraumatic embitterment syndrome (Jakovljevic et al. 2012b), can promote and exacerbate symptoms of PTSD and suicidal tendencies. Protective factors, such as posttraumatic growth (Lodhi et al. 2022), should also be investigated in the context of suicide risk following war experiences. Interview methods for the assessment of suicide ideation were not performed, however, there is evidence that self-report measures of suicidality can sometimes provide greater validity than interview methods (Kaplan et al. 1994). Also, other aspects of suicidality (e.g., number of suicide attempts, suicide methods and lethality) should be examined in future research on war veterans suffering from PTSD. Finally, because the current study included only male war veterans, our results cannot be fully extended to female veterans, and other war-affected individuals (e.g., refugees), who might exhibit different proneness to PTSD and suicide behaviors (Sagaltici et al. 2022).

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CONCLUSIONS

This study has documented a substantial proportion of suicide attempters among Croatian war veterans suffering from PTSD. In addition to some sociodemographic and clinical factors, temperament dimension Harm Avoidance and character dimension Self-transcendence seem to be uniquely associated with previous suicide attempts in this population. Given the difficulties in direct examination of suicide risk in military and veteran populations, routine assessment of personality traits might promote more effective prevention and treatment methods in this highly vulnerable population.

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Contribution of individual authors:

Nenad Jakšić: study design, literature search, data collection, statistical analyses, manuscript writing. Ivona Šimunović Filipčić, Marina Šagud & Davor Lasić: literature search, manuscript writing. Branka Aukst Margetić: study design, data collection. Darko Marčinko: study design, literature search. Miro Jakovljević: study design, data collection, literature search.

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