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Investigating the Relationship between Personality Factors and Suicide Risk

Tooba Tabatabai [a], Parvaneh Rashidpour [b], Hamidreza Ghasemirad [c], Mohammad Nadi [b], Mehrnoush Giahi Yazdi [d], Hamid Owliaey [e*], Reza Bidaki [f], Amirhossein Taheri [c]

[a] Department of Medical Science, Yazd Branch, Azad University, Yazd, Iran
[b] Department of Psychiatry, Medical School, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[c] Research Committee, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[d] General Practitioner, Social Security Organization of Yazd, Iran
[e] Department of Forensic Medicine & Clinical Toxicology, Yazd Branch, Islamic Azad University, Yazd, Iran
[f] Department of Psychiatry, Research Center of Addiction and Behavioral Sciences, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

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***Corresponding Author:**
Hamid Owliaey

Email:
owliaeyhamid2023@gmail.com

Tel: +989131540284

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ABSTRACT

Background: The present study aimed to investigate personality traits of patients who commit suicide by drug intoxication.

Methods: This cross-sectional study evaluated 180 patients who attempted suicide by drug intoxication at Shahid Beheshti Hospital, Yazd, Iran in 2022. Due to the census design, all patients who met the study criteria were enrolled. The risk of committing suicide was divided into low, low-to-moderate, and moderate-to-high risk categories using the Paterson criteria. Personality characteristics of the participants were compared using the temperament and character inventory (TCI) in different groups of suicide-attempting risk. Data were evaluated using SPSS version 23. Kruskal-Wallis test and Chi-Square test were used for analysis.

Results: The frequency of patients with low, low-to-moderate, and moderate-to-high risk of committing suicide accounted for 45.6%, 46.2%, and 7.2%, respectively. Reward dependence (RD) (P-value = 0.011) and cooperation (P-value = 0.003) represented significant decreases with increasing suicide risk using Kruskal-Wallis test. Other factors of the TCI, including novelty seeking (NS) (P-value = 0.880), harm avoidance (HA) (P-value = 0.660), persistence (P) (P-value = 0.361), self-directedness (SD) (P-value = 0.138), and self-transcendence (ST) (P-value = 0.623), were not associated with the risk of suicide attempt. There was a significant difference in the frequency of factors associated with the risk of suicide, including marital status, depression, and alcohol addiction in terms of age, and sex using Chi Square test (P<0.05). .

Conclusion: These results highlight the potential importance of reward dependence and cooperation in understanding suicide risk. In this regard, lower reward dependence and reduced cooperation are associated with higher suicide risk, while other psychological traits assessed by the TCI may not be as relevant.

Keywords: Suicide, Suicide Attempted, Temperament, Psychometrics

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Introduction

Completed suicide accounts for 800,000 lives each year worldwide and is the second leading cause of mortality in young adults (Conner & Bagge, 2019). For every suicide, it has been estimated that more than 20 nonlethal suicide attempts occur, primarily by overdose. The attempts are a leading cause of hospital admission and a potent risk factor for an eventual successful suicide (Baldessarini & sciences, 2020).

Suicidal thoughts trigger intense emotional reactions in those who are affected, potentially leading to suicidal ideation and behaviors, such as attempts or completed suicide. Therefore, it is crucial to gain a deeper understanding of the personality traits of individuals experiencing suicidal ideation, as this condition is closely linked to suicidal behaviors (Conrad et al., 2009).

The temperament and character mode of personality hold particular significance, as they attempt to describe the neurobiological structures that underlie the pervasive attitudes of an individual towards their environment (Solmaz et al., 2020). Cloninger proposes a theory that regards the dimensions of temperament as the "emotional core" of personality, which unconsciously influences learning processes. This idea explains heritable neurobiological dispositions, including harm avoiding, novelty seeking (NS), and reward obtaining. However, the theory continues that the behaviors are not totally automatic and involve higher cognitive functions known as the “cognitive core” of personality. Accordingly, other dimensions, including the attitudes towards self (self-directedness (SD)), society (cooperativeness (C)), and the universe (self-transcendence (ST)), have been proposed as well (Cloninger, 1994; Cloninger et al., 1993).

Personality traits can thus affect a patient’s tendency to respond with suicidal behavior in specific situations known to influence such actions (Bi et al., 2017).

Given that the prevalence of suicide attempts in the general population is 131.0 per 100,000 people (152 per 100,000 women and 128 per 100,000 men) (Asad et al., 2023), and recognizing the critical importance of suicide prevention in all communities, there is a lack of comprehensive research on this issue in Yazd province. Therefore, the current study aimed to examine personality traits among individuals who have attempted suicide through overdose.

Methods

Study population

The current retrospective cross-sectional study was conducted on 181 individuals with suicide attempts via drug poisoning admitted to Shahid Beheshti Hospital in Taft, Yazd Province, in the center of Iran, from August 2021 to April 2022. Due to the census design, all patients who met the study criteria were enrolled.

The study protocol was designed based on the tenets of the Helsinki declaration, primarily proposed to the Ethics Committee of Azad University of Medical Sciences, Yazd Branch. Then, the study was explained to the patients and their legal guardians; they were assured of the confidentiality of their personal information, and they signed the consent form to participate in the study.

The study included over 15-year-old patients with unsuccessful suicide attempts through overdose who were admitted to the hospital and requested a psychiatry consult. Incomplete medical records and inappropriate responses to the questionnaire, accounting for more than 20% of the study data, were considered the exclusion criteria.

Data collection

The study population demographic characteristics, including age and gender, were gathered from the medical records.

Then, the potentiality of suicide attempts was evaluated using the Suicide Risk Factors Assessment Scale provided by Paterson, derived from Brems. Based on this scale, 10 factors including irrational thinking (suicide impulsivity or a sudden and an unplanned suicide attempt),

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significant physical disorder (malignancy, AIDS, chronic incurable disease or maim such as upper or lower extremity amputation), age (15-24 or ≥50 years old), gender (male gender mostly exhibits serious suicidal behaviors), drug abuse (alcohol, opium, marijuana, and heroin), marital status (divorced, widow/ widower, bachelor), depression, lacking of social support (emotional, value, informational, material and network support by family, friends, and other institutions), and a previous history of suicide attempt and an organized plan for suicide (any planning to commit suicide hours before the act, such as preparing medicine and other suicide devices, or tendency to get alone in the house, or the presence of symptoms, including determining the time and place of suicide) (Brems, 2000). Each of the above subscales had one point, and the sum of the points was understood to mean that the risk of suicide attempts was low ("requiring follow-up"), moderate ("voluntary admission"), and high ("mandatory admission") (Zare et al., 2010).

In the next step, temperament and character inventory (TCI) was applied to determine the personality traits of patients with different risks for suicide attempts. This test was first suggested by Cloninger et al., and it measures six personality traits: NS, harm avoidance (HA), reward dependence (RD), persistence (P), C, SD, and ST. This scale has been converted to Persian by Kaviani et al. with Cronbach's alpha of over 0.70 for the subscales (Kaviani, 2005).

Statistical analysis

The obtained data entered the Statistical Package for Social Sciences (SPSS Inc. PASW statistics for Window Chicago), version 23. The categorical variables were presented in absolute numbers and percentages, while continuous ones were presented in mean ± standard deviation. The frequency comparison of factors associated with the risk of suicide commitment in terms of sex and age was done using chi-square test.

The One-Sample Kolmogorov-Smirnov test was employed to check if the data followed a normal distribution. Normality is an important assumption for many statistical tests, so this test helps determine which statistical methods are appropriate for further analysis. The P-value being less than 0.01 suggests that TCI data does not adhere to a normal distribution. This reinforces the need to use non-parametric tests. The Kruskal-Wallis test, a non-parametric test, was used to compare TCI scores across different groups of patients categorized by their risk of suicide attempts.

Results

In the current study, data from 181 patients attempting suicide via overdose were recruited. The study population predominantly consisted of females (n = 99, 54.7%) and had a mean age of 30.02±12.56 years old (age range: 15–76 years old).

Table 1 shows the frequency of factors associated with the risk of suicide commitment. (Table 1).

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Table 1. The frequency of factors associated with the risk of suicide commitment

Variable	Frequency	Percentage
Non-married	60	33.1
Age <24 or ≥50 years old	57	31.5
Depression	92	50.8
Positive history of unsuccessful suicide attempt	52	28.7
Drug abuse	35	19.3
Irrational thinking	16	8.8
Lacking of social support	25	13.8
Evidence of a plan to commit suicide	68	37.6

Table 2 shows TCI scores in patients with different risks of suicide attempt (Table 2).

RD and Cooperation are the most significant factors related to suicide risk, while the other TCI subscales are not significantly linked (Table 2).

Table 2. TCI scores in the patients with different risks of suicide attempt

TCI parameter	Risk of suicide commitment			P-value
	Low	Low-to-moderate	Moderate-to-high	
Novelty seeking (NS)	9.63±3.54	9.57±3.13	9.38±4.31	0.880
Harm avoidance (HA)	10.15±4.06	8.58±4.26	10±4.95	0.660
Reward dependence (RD)	8.16±2.42	7.04±1.96	7.23±2.89	0.011
Persistence (P)	3.03±1.40	2.84±1.25	3.31±1.60	0.361
Self-Directedness (SD)	12.51±4.54	11.91±3.90	10.15±5.23	0.138
Cooperation (C)	16.60±4.58	15.17±4.22	12.38±4.61	0.003
Self-transcendence (ST)	8.56±3.42	8.45±2.90	7.77±3.79	0.623

*Kruskal-Wallis test

Table 3 shows the frequency comparison of factors associated with the risk of suicide in terms of sex (Table 3).

Table 3. The frequency comparison of factors associated with the risk of suicide in terms of sex

Variables	Sex		Total N (100 %)	P-value
	Female N (%)	Male N (%)		
Marital status				
Single	39 (32.2)	82 (67.8)	121	0.000
Married	60 (100)	0 (0)	60	
Total	99 (54.7)	82 (45.3)	181	
Depression				
No	41 (46.1)	48 (53.9)	89	0.022
Yes	58 (63)	34 (37)	92	
Total	99 (54.7)	82 (45.3)	181	
Positive history of unsuccessful suicide attempt No	71 (55)	58 (45)	129	
Yes	28 (53.8)	24 (46.2)	52	0.884
Total	99 (54.7)	82 (45.3)	181	
Alcohol addiction				
No	90 (61.6)	56 (38.4)	146	0.000
Yes	9 (25.7)	26 (74.3)	35	
Total	99 (54.7)	82 (45.3)	181	

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Table 3. The frequency comparison of factors associated with the risk of suicide in terms of sex

Variables	Sex		Total N (100 %)	P-value
	Female N (%)	Male N (%)		
Irrational thinking				
No	94 (57)	71 (43)	165	0.048
Yes	5 (31.2)	11 (68.8)	16	
Total	99 (54.7)	82 (45.3)	181	
Lacking of social support				
No	89 (57.1)	67 (42.9)	156	
Yes	10 (40)	15 (60)	25	0.112
Total	99 (54.7)	82 (45.3)	181	

*Chi-Square test

According to these results, there was a significant difference in the frequency of factors associated with the risk of suicide, including marital status, depression, alcohol addiction, and lack of social support, in terms of sex (P<0.05).

Table 4 shows the frequency comparison of factors associated with the risk of suicide in terms of age (Table 4).

Table 4. The frequency comparison of factors associated with the risk of suicide in terms of age

Variables	Age			Total N (100 %)	P-value
	15-24 N(%)	25-34 N (%)	35-76 N (%)		
Marital status					
Single	29 (24)	45 (37.2)	47 (38.8)	121	
Married	47 (78.3)	9 (15)	4 (6.7)	60	0.000
Total	76 (42)	54 (29.8)	51 (28.2)	181	
Depression					
No	47 (52.8)	28 (31.5)	14 (15.7)	89	0.001
Yes	29 (31.5)	26 (28.3)	37 (40.2)	92	
Total	76 (42)	54 (29.8)	51 (28.2)	181	
Previous failed suicide					
No	53 (41.1)	40 (31)	36 (27.9)	129	0.858
Yes	23 (44.2)	14 (26.9)	15 (28.8)	52	
Total	76 (42)	54 (29.8)	51 (28.2)	181	
Alcohol addiction					
No	67 (45.9)	36 (24.7)	43 (29.5)	146	0.007
Yes	9 (25.7)	18 (51.4)	8 (22.9)	35	
Total	76 (42)	54 (29.8)	51 (28.2)	181	
Irrational thinking					
No	72 (43.6)	46 (27.9)	47 (28.5)	165	
Yes	4 (25)	8 (50)	4 (25)	16	0.160
Total	76 (42)	54 (29.8)	51 (28.2)	181	
Lacking of social support					
No	65 (41.7)	48 (30.8)	43 (27.5)	156	0.775
Yes	11 (44)	6 (24)	8 (32)	25	
Total	76 (42)	54 (29.8)	51 (28.2)	181	

*Chi-Square test

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According to these results, there was a significant difference in the frequency of factors associated with the risk of suicide, including marital status, depression, and alcohol addiction in terms of age ($P<0.05$).

Discussion

The current study was conducted aiming at the assessment of factors associated with increased risk of suicide attempt or even completed suicide among those with an unsuccessful experience due to overdose. The results revealed that depression, an organized plan to commit suicide, being single, as well as high-risk ages (<20 or ≥44 years old) were the most common risk factors of suicide attempts in the studied subjects. The categorization of the patients into risk-stratified individuals for suicide attempts showed significant differences only in RD and C, while the other dimensions remained unchanged.

It was assumed that lack of significant differences between the studied subjects was due to their close scores on risk assessments. No case was found with a high risk of suicide attempt, which led us to categorize the patients into three groups: low, low-to-moderate, and moderate-to-high risk cases for suicide reattempt.

In this study, depression emerged as the most influential factor in suicide risk. Hawton et al. reported a strong association between depression and both suicide and non-fatal suicidal behavior, emphasizing that ongoing assessment of suicide risk should be integral to the management of patients with this disorder (Hawton et al., 2013), which is in line with the present study findings. Similarly, Nanayakkara et al. found that exposure to suicidal behavior in a friend or family member presents a risk comparable to that of severe depression (Nanayakkara et al., 2013). Silver et al. reported that 80% of patients attempting suicide scored in the depressed range, with a significant correlation between the depth of depression and the degree of suicidal intent (Silver et al., 1971). This finding also concurs with the current study. It seems that depression remains the most influential factor in suicide risk, as evidenced by both the present study and other studies. It is crucial for healthcare professionals to prioritize the ongoing assessment and management of depression, as well as to consider the broader social context, including exposure to suicidal behavior in family or friends, when evaluating suicide risk. Early identification and treatment of depression, along with a comprehensive risk assessment, could be a key in preventing suicidal behavior.

The results also showed that being single is one of the factors associated with an increased risk of suicide. Sook et al. found that non-married individuals have a higher aggregate suicide risk compared to married individuals (Kyung-Sook et al., 2018). This finding aligns with the results of the current study. Masocco et al., revealed that being married appears to be a protective factor against suicide (Masocco et al., 2008). Therefore, marital status, particularly being married, seems to provide protective benefits against suicide, which may be attributed to emotional and social support. Moreover, age was identified as another influential factor on suicide, which is consistent with the findings of Sook et al. (Kyung-Sook et al., 2018).

NS is at the top of the list of factors associated with increased risk of committing suicide; however, no association was found in the current study. Ardani et al. reported that individuals with mood NS exhibited significantly higher levels of NS.

HA, another subcategory of TCI, showed a negligible difference among the subjects. In general, studies have indicated that HA increases significantly in people with suicidal ideation or attempts (4, 10). Cloninger states that people with the temperament profile of HA have characteristics such as caution, stressfulness, timidity, insecurity, and pessimism (Cr, 1987). It has been well-elucidated that neurochemical transmitters are basically associated with mood characteristics; accordingly, studies have shown that suicide attempts are related to serotoninergic activity in the prefrontal cortex (Cloninger et al., 1993). Van Heeringen et al. confirmed this by demonstrating a reduced 5-HT2a binding potential in the prefrontal

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cortex of individuals who had attempted suicide. They maintained that there was a case association between 5-HT2a binding potential and HA (Van Heeringen et al., 2003). Overall, central serotonergic function and HA can be linked to the likelihood of suicide attempts, but more research is needed to clarify this relationship.

In the next step, patients were examined in terms of RD, which showed that lower RD was significantly related to the increased risk of committing suicide. These findings were in line with previous studies (Lewitzka et al., 2016). The nature of RD shows an individual's expectation of encouragement for fulfilling a social proposition—a definition that supports the fact that suicidal individuals become indifferent to this encouragement. They do not care about social responses to their performance, for instance, suicide attempts as one of these social activities (Kim et al., 2022).

There was no association between SD as one of the dimensions in TCI questionnaire and the risk of a suicide attempt. The main manifestation of SD refers to self-efficacy and the ability to regulate behaviors (Hamza et al., 2015). different studies have assessed the effect of this dimension on suicidal ideation or attempts, yielding controversial results. While the majority of studies have indicated lower SD in suicidal subjects (Hong et al., 2022; Solmaz et al., 2020), others, consistent with our findings, found no relation (Nock et al., 2004; Park, 2016).

P is another subcategory of TCI that is not associated with the risk of a suicide attempt in the current study. There was also disagreement among scholars regarding the relationship between P and suicidality. Some authors found no relation (Bae et al., 2020; Lüdtke et al., 2017),while others declared lower P in people with suicidal attempts (Kim et al., 2022). This diversity can be attributed to the two-way nature of P. Low P can be considered a maladaptive trait in situations where continuous effort is required to solve a problem, given its nature to easily give up in the face of frustration, criticism, and obstacles. Conversely, it can also be viewed as an adaptive temperament, capable of adjusting strategies to overcome obstacles and achieve rewards (Cloninger, 1994). Therefore, a strong correlation between RD and P could potentially be linked to suicidality in individuals with low P.

C is another subcategory of TCI that is significantly related to the risk of suicide attempts. Further investigations showed that subjects with higher risks of suicide had lower C. Individuals who commit suicide do not enjoy their relationships with others. Therefore, low scores of C are not unusual in cases with suicidal ideation or attempts, a finding that has been confirmed by other studies (Calati et al., 2008; Erdős-Hegedűs, 2021). C disorder is associated with conflicts in identity, empathy, and performing immature and suspicious behaviors (Bulik et al., 1999). Therefore, Smith et al. have stated that improving the subcategory of C can help these patients alleviate their suicidal ideation (Smith et al., 2008), while another study has demonstrated that cognitive-behavioral approaches based on improving cooperation can significantly reduce suicidality in individuals with suicidal ideation (Sørensen & Lien, 2022).

The last subcategory refers to ST, defined as accepting and appreciating spiritual and religious beliefs (12). This characteristic, which refers to self-forgetfulness, transpersonal identification, and spiritual acceptance, had no association with suicide attempts in our study, while other studies represented ST as a predictive factor for suicide ideation and attempts. The higher the ST score, the higher the risk of committing suicide (Jylhä et al., 2016). It is noteworthy to consider that at first glance, ST indicates spirituality, unpretentiousness, creativity, and humility, which seem to be a preventive factor of suicide (Ardani et al., 2015). However, a high ST in conjunction with a low SD can be seen as an indicator of irrational, immature, and suspicious behaviors (Erdős-Hegedűs, 2021). However, external parameters affecting a person's actions should not be underestimated.

This study has several limitations. Conducting it in a single hospital (Shahid Beheshti Hospital, Yazd) restricts the generalizability of the findings to

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other populations. The use of self-reported data from the TCI may introduce recall and social desirability biases. Moreover, the absence of a control group of non-suicidal individuals limits comparative analysis. The small sample size in the moderate-to-high risk category (7.2%) may have reduced statistical power. Lastly, since the study focused solely on patients who attempted suicide via drug intoxication, the findings may not be applicable to individuals using other methods.

Conclusion

Based on the findings, these results highlight the potential importance of reward dependence and cooperation in understanding suicide risk. In this regard, lower reward dependence and reduced cooperation are associated with higher suicide risk. while other psychological traits assessed by the TCI may not be as relevant.

To improve research on the link between personality traits and suicide risk, future studies should use larger, more diverse samples across regions for better generalizability. Longitudinal studies are recommended to determine whether traits like Reward Dependence and Cooperation are stable risk factors or change over time. Including psychological and social factors (e.g., coping strategies, social support) would deepen understanding.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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Ethical Considerations

This study was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki. The research protocol was approved by the Ethics Committee of Azad University of Medical Sciences, Yazd Branch

Code of ethics

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Authors' Contributions

P.R. conceived the presented idea. T.T and M.N developed the theory and performed the computations. H.Gh and M.G wrote the manuscript. H.O, R.B, A.T edited the manuscript. All authors discussed the results and contributed to the final manuscript.

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