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The Role of Psychological Factors in Non-suicidal Self-injury of Female Adolescents

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Abstract

Background: Non-suicidal self-injury (NSSI) is defined as inflicting damage to one's own body. It begins in adolescence and tends to become chronic.

Objectives: Considering the high prevalence and chronicity of NSSI among girls, the present study aimed to investigate the factors affecting the prevalence of NSSI in female adolescents from their perspective.

Methods: The participants consisted of 604 female high-school students in Saveh, aged 14 - 17 years (14.29 $\pm$ 1.11), who were selected via random cluster sampling from November 2018 to January 2019. They answered six questionnaires, including the Inventory of Statements About Self-injury (ISAS), Ways of Coping questionnaire (WCQ), Child Abuse Self-report scale (CASRS), Family Emotional Involvement and Criticism scale (FEICS), Emotion Reactivity scale (ERS), and Aggression questionnaire (AQ). Data were analyzed using logistic regression analysis.

Results: The predictor variables of child abuse, emotion reactivity, perceived parental criticism, family emotional involvement, and problem- and emotion-focused coping styles could successfully distinguish NSSI individuals from those without NSSI ($P < 0.05$). There were no significant differences between minor and moderate groups.

Conclusions: Family emotional support is a protective factor, while criticism, child abuse, and emotion-focused coping style are risk factors for NSSI.

Keywords: Aggression, Child Abuse, Criticism, Emotion-focused Coping Style, Family Support, Minor, Moderate, Non-suicidal Self-injury

1. Background

The high prevalence (17% - 38%) of non-suicidal self-injury (NSSI) and risk of suicide in adolescents has attracted the attention of experts. Considering its importance, it was included in the diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) (1-5). According to different studies, the prevalence of NSSI behavior peaks at the age of 15 - 16 years and decreases at 17 years (6). In a study conducted in Iran, the prevalence of NSSI among female and male adolescents was 26.8% and 17.9%, respectively (7). Evidence suggests that this behavior is more common in females (8-11).

Most studies on the etiology of NSSI originate from the Learning theory. DSM-5 introduces two theories of "learning" and "punishment" as causative factors. Nock and Favazza (1) summarized various theories about this behavior and described two main reasons for it, including finding relief from unpleasant emotions and experiencing pleasant emotions. In Nock's model, causative factors are divided into two groups of distal factors (e.g., childhood abuse, genetics, and stressful events) and special factors (e.g., peer imitation, self-punishment, and social patterns). In general, it seems that the main intention behind NSSI is to regulate emotions and influence social situations (12). Based on the proposed models, various studies have been conducted to investigate the factors affecting NSSI. Some factors are proper predictors of NSSI behavior, such as child maltreatment, parents' emotional neglect (13-19), maternal criticism (20), lack of parental expressed emotions (21-23), higher levels of emotion-focused coping, such as escape and avoidance (24), emotional reactivity (25-29), verbal aggression, hostility, and indirect aggression (30, 31).

In most studies, the social and cultural aspects have less been considered, and studies on NSSI have rarely been done in Iran. Although in previous studies different variables affecting NSSI were not clear, in this study, we selected different variables by considering group sessions that fo-

cused on adolescents with NSSI. These variables were the same used in previous studies, and then, the effective variables affecting Iranian adolescents were selected.

2. Objectives

Firstly, this study aimed at estimating the prevalence of NSSI in Iranian female adolescents because of the lack of epidemiological studies on NSSI in Iran. Secondly, the fundamentals factors influencing NSSI behavior in female adolescents with and without NSSI were investigated. Moreover, the various methods of self-injuries regarding their severity were examined based on the DSM-5. The obtained findings can be helpful in timely screening and designing effective treatments for adolescents.

3. Methods

3.1. Design and Participants

The study population consisted of all female high-school students in Saveh, Iran, aged 14 - 17 years (mean age = 14.29 $\pm$ 1.11 years). Six-hundred and four students in the 7th to 11th grades were selected as the study samples, using random cluster sampling from four high schools from November 2018 to January 2019. Inclusion criteria were the provision of informed consent. Self-injury with suicide intent and suicide attempt in four last months, which is answered in the demographic questionnaire and incomplete questionnaires, were excluded from the research analysis. Since 33 participants, who did not fill out the questionnaire completely, were excluded from the study, a total of 571 subjects were included in the study. Before the study, the objectives were explained to the participants, and they were asked to sign an informed consent form while emphasizing their voluntary participation. All questionnaires were given to the participants. Inventory of statements about self-injury (ISAS) was the first questionnaire, and the participants were asked to answer if they had this behavior. Otherwise, they answered the second questionnaire. The subjects were divided into two groups with or without NSSI based on their self-report while answering the first part of the ISAS questionnaire. Those with NSSI were assigned to the minor and moderate groups based on the DSM-5 criteria, which considers lethal or non-lethal self-injury and repetition of self-injury (4 times and more). Ethical approval was obtained from the Research Ethics Committee of the University of Social Welfare and Rehabilitation Sciences (ethical code: IR.USWR.REC.1396.391).

3.2. Instruments

3.2.1. Inventory of Statements About Self-injury

Inventory of statements about self-injury (ISAS) has two parts. The first part evaluates the lifetime frequency of 12 NSSI behaviors shown intentionally without any suicidal intent. Subjects with one or more NSSI behaviors were asked to complete the second part. This part generally evaluates 13 potential NSSI functions with two interpersonal and intrapersonal subscales. Each function is rated on a scale of 0 to 2, with scores each ranging from 0 to 6. The internal consistency of the questionnaire has been reported to be high (0.84). Also, the test-retest reliability of the omnibus NSSI scale has been measured to be 0.85, and its construct validity has been confirmed (32). In Iranian opioid and alcohol abusers, the total Cronbach's alpha coefficient for this subscale was 0.93 (33). Cronbach's alpha coefficient of this questionnaire was 0.97 in this study.

3.2.2. Ways of Coping Questionnaire

This scale was designed by Lazarus and Folkman and consisted of 66 items and eight subscales with two categories: problem-focused coping, emotion-focused coping. This scale is rated on a four-point Likert scale (1 = never to 4 = always). Lazarus reported internal consistency coefficients of 0.66 to 0.79 for the subscales of coping styles (34). The reliability of the Ways of Coping questionnaire (WCQ) using Cronbach's alpha was reported to be 0.81 in the Iranian population. In addition, experts have reported its adequate face validity (35). Cronbach's alpha coefficient was 0.85 in the present study.

3.2.3. Child Abuse Self-report Scale (CASRS)

This tool was developed by Mohammadkhani et al. (36) and consisted of 38 items, assessing four subscales of physical, sexual, and psychological abuse and neglect. The neglect subscale had reversed scoring. Cronbach's alpha coefficient for this questionnaire was measured to be 0.92. The coefficients for the subscales of sexual, physical, psychological abuse, and negligence were 0.78, 0.81, 0.72, and 0.74, respectively. Moreover, the scale was confirmed to have adequate face validity (36). Cronbach's alpha coefficient was reported to be 0.92 for this tool in our study.

3.2.4. Family Emotional Involvement and Criticism Scale

This scale consists of two subscales: perceived criticism (PC) and emotional involvement (EI). Scoring is based on a five-point Likert scale (1 = almost never to 5 = almost always). The even items are related to the PC scale, and the odd items assess the intensity of EI. Cronbach's alpha coefficients for EI and PC were reported to be 0.74 and 0.82, respectively, and the face validity of the questionnaire was

high (37). Cronbach alpha of the Family Emotional Involvement and Criticism scale (FEICS) ranged from 0.60 to 0.65 in an Iranian population (38). Cronbach's alpha coefficients for both subscales were reported to be 0.72 in this study.

3.2.5. Emotion Reactivity Scale

It is a 21-item self-report measure designed to assess the individuals' experience of emotional reactivity. Emotion Reactivity scale (ERS) inquiries three aspects of emotion reactivity: sensitivity, arousal/intensity, and persistence. Each item is rated on a 0 - 4 scale (0 = not at all like me and 4 = completely like me), with total scores ranging from 0 to 84. The strong internal consistency of ERS has been reported ($\alpha = 0.94$). Experts have also reported the good face validity of this scale (29). The internal consistency and reliability of the test were 0.92 and 0.72, respectively, in an Iranian population (39). Cronbach's alpha coefficient was reported to be 0.91 for this questionnaire in our study.

3.2.6. Aggression Questionnaire

Aggression questionnaire (AQ) is a 29-item scale designed by Buss and Perry (40), which measures four dimensions of aggression, including physical aggression, verbal aggression, anger, and hostility. The total score indicates the overall aggression. Cronbach's alpha coefficient for the subscales of physical aggression, verbal aggression, anger, and hostility were 0.85, 0.72, 0.83, and 0.77, respectively, and the coefficient for the overall questionnaire was 0.89. Moreover, its construct validity was high (41). The reliability of the test in an Iranian population was 0.78 (41). Cronbach's alpha coefficient was measured to be 0.92 for this questionnaire in this study.

3.3. Data Analysis

For analyzing the collected data, descriptive statistics (mean and standard deviation) were measured to describe the variables in the study groups and severity subgroups. Several binary logistic regressions were performed to identify variables, which could cause a significant difference between the study groups and severity subgroups. To measure the precise relationship between the variables, an ANOVA test was performed. Moreover, for any significant omnibus effects, univariate tests, as well as Tukey's post hoc test, were carried out. All tests were performed in SPSS V. 22.

4. Results

4.1. Prevalence and Frequency of NSSI

The results showed that 38.7% of students had committed NSSI at least once in their lifetime. Among 571 samples, 160 (17.51%) had NSSI based on the DSM-5 criteria (14.32 $\pm$ 1.07). Overall, 14.9% had minor NSSI, and 23.1% had moderate NSSI. Nearly 26.9% of students had used one specific method for NSSI, and 73.1% had used more than one method. The most common method was cutting (13.8%), and the least common method was eating toxic substances and dipping needles (4.4%). In 57.6% of students, parents' education level was primary school education. The mean age of NSSI onset was 12.8 $\pm$ 0.95 years. The results showed that 57.6% of patients with moderate NSSI (12.58 $\pm$ 0.78) and 71.4% of those with minor NSSI (12.4 $\pm$ 0.73) had committed NSSI for the first time at the age of 12 years.

4.2. Factors Associated with NSSI and Its Subcategories

Table 1 presents the descriptive statistics and the results of logistic regression analysis in the two groups of NSSI and non-NSSI. The results indicated factors that distinguished the two groups. The logistic regression analysis was significant [χ^2 (7, N = 571) = 142.06; P < 0.001] and indicated that variables, including child abuse, emotion reactivity, PC, EI, problem-focused coping, and emotion-focused coping, were 1.5 times higher in the NSSI group than the non-NSSI group. These predictor variables could distinguish students with NSSI from those without NSSI.

Table 2 presents the descriptive statistics for all NSSI variables in the study groups. The results of logistic regression analyses, presented in Table 3, indicated factors that could differentiate minor, moderate, and non-NSSI groups. The differences between the non-NSSI group and minor NSSI subgroup and between the non-NSSI group and moderate NSSI subgroup were significant [χ^2 (7, N = 439) = 27.445, P < 0.001; χ^2 (7, N = 486) = 135.976, P < 0.001]. With respect to the individual predictors, the results showed that in comparison with the non-NSSI group, the minor subgroup had higher PC and lower EI. In the moderate subgroup, high levels of child abuse and emotion-focused coping style and low levels of EI and problem-focused coping style were reported.

Table 4 presents a summary of three logistic regression analyses between the non-NSSI group and minor and moderate NSSI subgroups, based on the DSM-5 criteria. The differences between the non-NSSI group and minor NSSI subgroup [χ^2 (7, N = 446) = 28.84; P < 0.001] and between the non-NSSI group and moderate NSSI subgroup [χ^2 (7, N = 536) = 124.21; P < 0.00] were significant. With respect to individual (single) predictors, the minor NSSI subgroup showed higher PC, while in the moderate NSSI subgroup, higher levels of child abuse and emotion-focused coping style were reported. On the other hand, problem-focused coping style was reported as the least frequent variable. The difference between the minor and moderate NSSI subgroups [χ^2 (9, N = 160) = 12.28; P > 0.05] was not significant.

Table 1. Descriptive Statistics and Logistic Regression Analysis Results of the Two Study Groups[a]

Variables	Non-NSSI Group (N = 411)	NSSI Group (N = 160)	Summary of Logistic Regression Analysis		95% CI	
			B (SE)	OR	Lower	Upper
Age	14.3 (1.13)	14.28 (1.08)	-	-	-	-
Age of onset	-	12.8 (0.95)	-	-	-	-
Child abuse	18.613 (13.69)	33.562 (18.82)	0.031 (0.008)[b]	1.032	1.017	1.048
Emotion reactivity	32.294 (16.78)	44.212 (17.625)	0.021 (0.008)[c]	1.021	1.004	1.038
Aggression	63.289 (18.53)	76.568 (21.731)	-0.001 (0.007)	0.999	0.984	1.013
PC	17.661 (3.64)	20.156 (3.624)	0.071 (0.031)[d]	1.073	1.009	1.141
EI	23.997 (5.33)	20.906 (5.548)	-0.049 (0.022)[d]	0.952	0.912	0.993
Problem-focused coping style	66.124 (10.40)	62.668 (12.652)	-0.046 (0.012)[b]	0.0955	0.932	0.979
Emotion-focused coping style	69.362 (9.63)	72.581 (10.866)	0.033 (0.015)[d]	1.034	1.005	1.064

Abbreviations: OR, odds ratio; SE, standard error.
[a]Values are expressed as mean (SD) unless otherwise indicated.
[b]$P < 0.001$.
[c]$P < 0.01$.
[d]$P < 0.05$.

Table 2. Descriptive Statistics of the Study Variables in the Groups[a]

Variables	Minor NSSI Subgroup (N = 35)	Moderate NSSI Subgroup (N = 125)	Non-NSSI Group (N = 411)
Age of onset	12.4 (0.73)	12.58 (0.78)	
ISAS			
Interpersonal scale	12.08 (8.49)	14.21 (7.44)	
Intrapersonal scale	13.6 (9.25)	14.62 (7.45)	
Child abuse	27.6 (14.76)	35.23 (19.54)	18.61 (13.69)
Emotion reactivity	40.11 (15.46)	45.36 (18.07)	32.29 (16.78)
Aggression	62.65 (24.97)	72.09 (20.27)	57.22 (18.46)
FEICS			
PC	20.48 (3.66)	20.06 (3.62)	17.66 (3.64)
EI	21.42 (5.38)	20.76 (5.6)	23.99 (5.33)
Coping style			
Problem-focused coping style	63.34 (11.96)	62.48 (12.8)	66.12 (10.4)
Emotion-focused coping style	70.85 (10.77)	73.06 (10.88)	69.36 (9.63)

[a]Values are expressed as mean (SD).

None of the predictor variables could differentiate minor and moderate subgroups.

A multi-factor ANOVA test was performed to examine the relationship between variables more closely. The results of ANOVA test were found to be significant [Wilks' λ = 0.75; F (14, 1124) = 11.92; P = 0.000]. Single-factor analysis showed significant differences in terms of all variables. The Eta coefficient for the variable of child abuse [F (2,568, 13665) = 58.95; P = 0.000] was higher than that of other variables. Next, Tukey's post hoc test was performed to evaluate differences between the groups. The results of this test for the variable of child abuse showed a significant difference between the non-NSSI group and minor and moderate NSSI subgroups (P = 0.002 and P = 0.000, respectively); however, the difference between the two minor and moderate subgroups was not significant.

In terms of emotion reactivity and aggression variables, the difference between the non-NSSI group and mod-

Table 3. Logistic Regression Analysis Results of the Two Study Groups Based on the Severity of NSSI

Variables	Mean (SD)	Minor NSSI (N = 85) vs. Non-NSSI (N = 354)		Moderate NSSI (N = 132) vs. Non-NSSI (N = 354)	
		B(SE)	OR	B (SE)	OR
Child abuse	33.56 (18.82)	0.015 (0.010)	1.015	0.036 (0.008)[a]	1.037
Emotion reactivity	44.21 (17.62)	-0.006 (0.011)	0.994	0.010 (0.010)	1.010
Aggression	76.56 (21.73)	0.005 (0.009)	1.005	0.012 (0.009)	1.013
PC	20.15 (3.62)	0.096 (0.037)[b]	1.101	0.065 (0.037)	1.067
EI	20.9 (5.54)	-0.056 (0.026)[c]	0.946	-0.051 (0.025)[c]	0.950
Problem-focused coping style	62.66 (12.65)	0.001 (0.014)	1.001	-0.045 (0.014)[a]	0.956
Emotion-focused coping style	72.58 (10.86)	-0.019 (0.018)	0.981	0.041 (0.017)[b]	1.042

Abbreviations: OR, odds ratio; SD, standard deviation; SE, standard error.
[a] P < 0.001.
[b] P < 0.01.
[c] P < 0.05.

Table 4. Descriptive Statistics and Logistic Regression Analysis Results of the Study Groups Based on the DSM-5 Criteria

Variables	Mean (SD)	Minor NSSI (N = 35) vs. Non-NSSI (N = 411)		Moderate NSSI (N = 125) vs. Non-NSSI (N = 411)		Minor vs. Moderate NSSI	
		B (SE)	OR	B (SE)	OR	B(SE)	OR
Interpersonal scale	13.75 (7.708)	-	-	-	-	0.049 (0.049)	1.05
Intrapersonal scale	14.40 (7.86)	-	-	-	-	-0.045 (0.045)	0.956
Child abuse	33.56 (18.82)	0.013 (0.014)	1.013	0.036 (0.008)[a]	1.037	0.020 (0.014)	1.02
Emotion reactivity	44.21 (17.62)	0.023 (0.016)	1.024	0.014 (0.009)	1.014	0.00 (0.015)	1
Aggression	76.56 (21.73)	-0.022 (0.013)	0.978	0.006 (0.009)	1.006	0.017 (0.013)	1.017
PC	20.15 (3.62)	0.175 (0.054)[a]	1.191	0.045 (0.036)	1.046	-0.095 (0.062)	0.909
EI	20.9 (5.54)	-0.058 (0.039)	0.944	-0.039 (0.024)	0.962	0.016 (0.040)	1.017
Problem-focused coping style	62.66 (12.65)	-0.024 (0.021)	0.976	-0.048 (0.014)[a]	0.953	-0.024 (0.026)	0.976
Emotion-focused coping style	72.58 (10.86)	0.031 (0.026)	1.013	0.037 (0.016)[b]	1.038	0.026 (0.031)	1.026

Abbreviations: OR, odds ratio; SD, standard deviation; SE, standard error.
[a] P < 0.001.
[b] P < 0.05.

erate NSS subgroup was significant (P = 0.000). Regarding the PC variable, there was a significant difference between the non-NSSI group and minor and moderate subgroups (P = 0.000). Moreover, regarding the EI variable, there was a significant difference between the non-NSSI group and the moderate subgroup (P = 0.000). Finally, in terms of problem-focused and emotion-focused coping styles, there were significant differences between the non-NSSI group and minor and moderate subgroups (P = 0.001 and P = 0.004, respectively).

5. Discussion

The first purpose of this study investigated the prevalence of NSSI behavior in female high-school students. The results showed that 38.7% of girls, aged 14 - 17 years, had committed NSSI at least once in their lifetime, and 17.51% had committed NSSI based on the DSM-5 diagnostic criteria over the past year. This result was consistent with some previous studies (3), while the prevalence rate was higher in some countries (42). In the glance of studies, there is no exact basis for evaluating the NSSI because the difference between the numbers of recurrences in a lifetime and the various questionnaires may make different results. Furthermore, errors in judgment and recalling due to the retrospective design of the study or one's refusal to share such experiences because of cultural factors. Besides, in some cases, adolescents may express a tendency towards NSSI for sympathizing with friends who show this behavior, while they do not, in fact, commit this behavior.

The second purpose of this study was to investigate the factors affecting NSSI in female students. In this regard, child abuse, coping styles, family emotional involvement and criticism, emotion reactivity, and aggression were analyzed. The results indicated that child abuse experience increases the prevalence of NSSI behavior in adolescents. In addition, child abuse was a stronger predictor in those with moderate NSSI; this result is consistent with the findings of previous studies (1, 13, 16, 19, 30, 43-45). Child abuse occurs during childhood when the child's mind is at max-

imum growth, and other primary components, such as attachment, type of reaction to stress, emotional regulation, and executive functioning, are developing (46-48). Confrontation with abuse during childhood disrupts the attachment process, and as a result, creates an insecure attachment style in the abused person. These people have problems coping with stress and social interactions (49-51). As shown in the present study, in individuals with NSSI, child abuse experience and use of emotion-focused coping styles are more common during adolescence.

Aggression was another factor that showed a significant effect, which is consistent with previous studies (30, 31, 52). Dodge et al. (53) indicated that aggression factors, such as parents' aggressive behavior, gender, economic and cultural conditions, and hostile bias can result in aggressive behaviors. Aggressive behavior of adolescents increases due to the lack of development in advanced social skills, and especially their parents play a key role in their ability to deal with stressful situations (52). In the first author's interview, one of the participants responded that when others treat me aggressively, I repeat the same behavior.

Furthermore, individuals with NSSI had higher PC and EI than the non-NSSI group, which is in line with previous studies (20, 21, 37, 54, 55). Parents' characteristics and their problems directly affect their emotional self-regulation, which in turn interrupts their relationship with children, increases critical behaviors, and as a result, decreases the perceived emotional support by children (55, 56). Emotion reactivity was stronger in the NSSI group than the non-NSSI group. This finding is consistent with some previous studies (28, 29, 39, 57), which showed that people with NSSI behavior have a higher level of arousal, which is related to their emotion regulation and response to emotions, leading to maladaptive NSSI behaviors (28).

The results showed that problem-focused coping style was lower in students with NSSI than those without NSSI and higher than those with emotion-focused coping style; this result is consistent with some previous studies (58, 59). These individuals often use emotion-focused styles to cope with their problems (24). The problem-focused coping style is an important factor in the efficient regulation of emotions and prevention of emotional and impulse-based decisions (26, 60). However, since this relationship is multidimensional, findings are not sometimes statistically significant (26).

Comparison of the two groups indicated higher levels of PC, child abuse, and emotion-focused coping style in those with minor NSSI, while in those with moderate NSSI, lower levels of problem-focused coping style were reported. As mentioned above, it seems that child abuse can have profound and devastating effects and lead to more maladaptive behaviors in adolescence. These results may be attributed to the higher number of students with moderate NSSI, which can affect the outcomes and cause the greatest difference between the non-NSSI group and moderate NSSI subgroup. The time-consuming process of answering the questionnaires, as well as the absence of parents, were the study limitations. In future studies, it is recommended to consider younger adolescents and late childhood periods because the maturity in girls happens in the last years of primary school when these girls show NSSI behavior with more severity, as most of the participants announced. There was a significant relationship between the beginning of maturity and NSSI behavior.

5.1. Conclusions

In this study, the factors affecting NSSI behavior among girl adolescents were investigated. The obtained results indicated that NSSI behavior is more prevalent among cases who experienced child abuse, parental criticism, and emotion-focused coping strategies. In other words, emotion-focused coping makes the individual subjected to NSSI behavior, but family emotional support and problem-focused coping, as an inhibitor factor, prevent the appearance and continuing this behavior. Employing effective screening among children and adolescents at risk for this aggressive behavior in their future life should be considered in future studies.

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Footnotes

Authors' Contribution: Mahboubeh Abbasian, Abbas Pourshahbaz, Farhad Taremian, and Hamid Poursharifi conceived and designed the study. Mahboubeh Abbasian acquired the data. Mahboubeh Abbasian and Abbas Pourshahbaz performed the analysis and interpretation of the data. Mahboubeh Abbasian, Abbas Pourshahbaz, Farhad Taremian, and Hamid Poursharifi drafted the manuscript, revised it critically for important intellectual content, and performed the administrative, technical, and material support.

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