Original Article

The Mediating Role of Emotion Regulation and Intolerance of Uncertainty in the Relationship between Childhood Maltreatment and Nonsuicidal Self-injury in Adolescents

Maryam Ghaderi[1], Qasem Ahi[1], Shahram Vaziri[2], Ahmad Mansouri[3], Fatemeh Shahabizadeh[1]

[1]Department of Psychology, Islamic Azad University, Birjand Branch, Birjand, [2]Department of Psychology, Islamic Azad University, Roudehen Branch, Roudehen, [3]Department of Psychology, Islamic Azad University, Neyshabour Branch, Neyshabour, Iran

ORCID:

Maryam Ghaderi: https://orcid.org/0000-0002-4478-9299

Qasem Ahi: https://orcid.org/0000-0002-2772-7053

Abstract

Aims: The aim of the present study was to investigate the mediating role of emotion regulation and intolerance of uncertainty (IU) in the relationship between childhood maltreatment and nonsuicidal self-injury (NSSI) in adolescents. **Materials and Methods:** In this descriptive correlational study, 700 high school students studying in 2018–2019 from Kashmar were selected by multistage cluster sampling. The final analysis was performed on the 292 students who have at least once engaged in NSSI. Research tools include Deliberate Self-Harm Inventory, Child Abuse of Self-Report Scale, Difficulties in Emotion Regulation Scale, and Intolerance of Uncertainty Scale. Data were analyzed by structural equation modeling. **Results:** The findings showed that emotion regulation and IU mediate the relationship between childhood maltreatment and NSSI. **Conclusions:** The findings confirmed the mediating role of emotion regulation and IU in the relationship between childhood maltreatment and NSSI. As a result, it is crucial that specialists and therapists take these variables into account when dealing with adolescent students in counseling and treatment centers.

Keywords: Emotion regulation, intolerance of uncertainty, maltreatment, self-injury

Introduction

Most people in their natural state are not tolerant of pain, wounds, and injuries. However, the question as to why some people would act contrary to their nature has gone unanswered for thousands of years. Nonsuicidal self-injury (NSSI) has remained one of the most confusing and alarming types of behavior in humankind.[1] NSSI is directly deliberated self-harms such as cutting, burning skin, scratching, biting, hitting, headbanging, and carving the skin but without suicidal intent. These types of behavior are accepted neither socially nor culturally.[2] These behaviors were considered as a mental disorder in psychopathology. However, due to the prevalence of these behaviors and widespread of research conducted in this field, a diagnostic class was suggested to be added in the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders.[3]

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NSSI is very common and usually onset in adolescence.[4] These behaviors initiate in the average age of 11–15 years (early to mid-adolescence). The prevalence rate increases in mid-adolescence, and these conducts can last up to adulthood.[5] Although the real rate of prevalence is difficult to estimate, the studies demonstrate that this rate has risen in adolescents. Twelve to forty percentage of the nonclinical adolescent population is thought to manifest these behaviors.[6] It has been reported that 12% of high-schooler adolescent girls in Tehran display these types of behaviors.[7] The high prevalence of this behavior in adolescents is very worrying.[8]

Address for correspondence: Dr. Qasem Ahi, Department of Psychology, Islamic Azad University, Birjand Branch, Birjand, Iran.
E-mail: ahigh1356@yahoo.com

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NSSI can lead to suicidal ideation, suicidal attempts, and successful suicide.[8] In addition, NSSI is associated with physical injuries requiring immediate medical attention and care, body deformity, hospitalization,[9] financial losses, consumption of the useful time and energy of the mental health professionals,[10] academic problems, loneliness, social isolation, range of severe psychological disorders, and behavioral problems.[11] Consequently, due to the prevalence and negative outcomes, these behaviors are considered as a serious and threatening matter in most studies. Therefore, identifying the factors provoking these behaviors to prevent them is essential.[12]

The existing models emphasize the role of distal risk factors, intrapersonal/interpersonal vulnerability factors, and specific vulnerability factors in developing and maintenance NSSI.[1,13,14] One of the distal risk factors is childhood maltreatment.[1,13] Childhood maltreatment is the neglect and child abuse. It includes all types of physical, sexual, psychological abuse, and inattention toward children.[15] It can also happen in the shape of neglect, physical, emotional, psychological, and sexual abuse.[16] In many studies, this factor is one of the strongest predictors of developing NSSI.[17-19] However, the results were mixed regarding the association between childhood maltreatment and NSSI. In some studies, sexual abuse is one of the strongest predictors developing NSSI, while it is not the case in some others.[20] The same goes for physical abuse. In some of the studies, there is a relationship between physical abuse and NSSI, whereas in some others, there is not.[21]

Although the relationship between childhood maltreatment and NSSI has been confirmed, little attention has been paid to the mediating factors of this relationship. Emotion regulation or difficulty in emotion regulation it can be one of the risk factors related to NSSI. Also, it can be mediate the relationship between childhood maltreatment and NSSI. Emotion regulation is a process in which individuals modify their emotional experiences, expressions, and physiology and the situations eliciting such emotions to produce appropriate responses to the ever-changing demands posed by the environment.[22] According to Gratz and Roemer, emotion regulation may be conceptualized as involving the (a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired to meet individual goals and situational demands.[23] Difficulty in emotion regulation has a strong relationship with child and adolescent mental disorders, especially emotional disorders.[24] In etiology studies, difficulty in regulating emotions has been identified as one of the major reasons for self-harm behaviors, especially NSSI.[15,25,26] Some studies referred to the mediating role of emotion regulation in the relationship between childhood maltreatment and NSSI.[27,28] Finally, the results of other groups have shown that there is a relationship between childhood maltreatment and emotional regulation.[29-31] There is also an association between the history of trauma and emotion regulation.[32]

Here are the reasons why studying the mediating role of emotion regulation in the relationship between childhood maltreatment and NSSI are necessary: (1) adolescence is a critical period in the development of emotions; as a result of all these changes, emotion regulation deserves significant attention and (2) two theories exist regarding the relationship between emotion regulation and NSSI. (1) These people exhibit more severe emotional reactions due to their enduring internal vulnerability, which ultimately leads to self-injury and (2) difficulty in emotion regulation leads to self-injury.[33]

Intolerance of uncertainty (IU) can be one of the risk factors related to NSSI. It can also act as the mediator of the relationship between childhood maltreatment and NSSI. IU has been defined as a dispositional characteristic that results from a set of negative beliefs about uncertainty and its implications. People who are intolerant of uncertainty believe that uncertainty is stressful and upsetting, that being uncertainty about the future is unfair, that unexpected events are negative and should be avoided, and that uncertainty interferes with one's ability to function.[34] They perceive more situations as uncertain, and since they cannot tolerate ambiguity, they experience heightened emotional arousal and anxiety.[35] Such individuals are prone to ineffective reactions and negative mood and infective react in these situations, which will interfere with their functions, and eventually leads to carrying out the safe behaviors (maladaptive methods). According to the four-function model, NSSI is considered an automatic negative reinforcement. This model assumes that some people use of NSSI as a safe way to regulate the negative and intolerant emotions resulting from uncertainty.[36] Martin in his study showed that there is a relationship between IU and NSSI of students.[36] The studies demonstrated that there is a relationship between childhood maltreatment with IU[37] and distress tolerance.[38] Robinson *et al*. found that distress tolerance mediated the relationship between childhood maltreatment and mental health.[39] Ultimately, there is a relationship between emotion regulation and IU.[40]

Given the prevalence of NSSI[4-8,12] and its consequences,[8-12] the existence of contradictory information, the necessity of understanding the psychological mechanisms related to it, the lack of sufficient evidence to identify this type of behavior as a mental disorder,[39] and the lack of attention to mediating variables related to the relationship between childhood maltreatment and NSSI, The aim of the present study was to investigate the mediating role of emotion regulation and IU in the relationship between childhood maltreatment and NSSI in adolescents.

Materials and Methods

The research was a descriptive correlational study. The statistical population consisted of all 8th and 9th grade students

in the first high school as well as all the second high school students from Kashmar in the year of 2019–2020. According to some researchers, the minimum sampling size for the modeling is 200 people. Some others have also recommended that a 1000-sample group is excellent, a 500 group is very good, a 300 is good, a 200 is appropriate, and a 100-samples group is poor.[41] The sample consisted of 700 students who were selected by multistage cluster sampling. Therefore, we separated Kashmar city according to its social–cultural level into three areas. Then, from each area, two boys and two girls' high schools were selected randomly. In addition, all vocational schools were in the second and third areas because of the classification. Therefore, we decided to choose one boys' school of art from the second area and one girls' vocational school from the third area randomly. In sum, 14 high schools were selected at random. In the next step, from each high school, at least one and up to three classes from the first high schoolers (8th and 9th grade) and also from the second high schoolers (10th, 11th, and 12th grade) from various fields of the study (humanities sciences, experimental sciences, mathematical sciences, and vocational) were selected randomly. After obtaining a license from the Education and Training Office of Khorasan Razavi, coordination with school administrators and identify classes, the questionnaires were completed individually and in the presence of the researcher.

Inclusion criteria included the studying in the first (8th and 9th grade) or second high school, the age range of 14–19 years old, and consent to participate in the study. Exclusion criteria included the death of the parents, physical disabilities, the unattended and mistreated adolescents who were supported by charity centers, not giving consent, and not completed the questionnaire properly. Ethical considerations of the research included informed consent, confidentiality, and not doing any harm to the participants. Of the 700 questionnaires distributed, 622 questionnaires were qualified for analysis. Three hundred and thirty (42.97%) of them had no history of NSSI, whereas 292 of them have at least once engaged in these types of behaviors. The final analysis was performed on the 292 students who have at least once engaged in NSSI. Of the 292 people, 144 were boys and 148 were girls. Here are the results of how many times they have engaged in NSSI: 95 (32.5%): once, 52 (17.18%): twice, 46 (15.80%): three times, 41 (14%): four times, 23 (7.9%): five times, 16 (5.5%): six times, 5 (1.7%): seven times, 5 (1.7%): eight times, 3 (1%): nine times, 2 (0.7%): ten times, 3 (1%): eleven times, and 1 (0.35%): twelve times.

Deliberate Self-Harm Inventory

The Deliberate Self-Harm Inventory (DSHI) was developed by Gratz[42] to assess NSSI behaviors (such as burning the skin and cutting). It is a 17-item self-report measure that scored in a range from 0 (no) to 1 (yes). The internal consistency for Child Abuse of Self-Report Scale (CASRS) was reported 0.83. The test–retest reliability was reported 0.68.[42] Peyvaste Gar[7] reported good internal consistency (0.71) for DSHI. In the present study, Cronbach's alpha coefficient for the DSHI was 0.77.

Child abuse of Self-Report Scale

The CASRS was developed by Mohamadkhani, Mohammadi, Nazari, and Salavati.[43] It is a 38-item self-report instrument scored on a 4-point scale ranging from 1 (never) to 4 (always). The CASRS has four subscales sexual, emotional, and physical abuse as well as neglect. The internal consistency for CASRS was reported 0.79. The test–retest reliability was reported 0.89.[43] In the present study, Cronbach's alpha coefficient for the CASRS was 0.71.

Difficulties in Emotion Regulation Scale

The Difficulties in Emotion Regulation Scale (DERS) was developed by Gratz and Roemer.[23] It is a 36-item self-report measure scored on a 5-point scale ranging from 1 (almost never) to 5 (almost always). It has six subscales, such as nonacceptance of emotional responses, difficulty engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. The internal consistency for DERS was reported 0.93. Cronbach's alpha coefficients for the subscales were 0.80–0.89. The 4–8 week test–retest reliability was reported 0.88 (subscales were 0.57–0.89).[23] Khanzadeh, Saeediyan, Husseinchari, and Edrissi[44] confirmed the six-factor structure of the Persian version of this scale. They report good internal consistency for DERS (0.86–0.88). The test–retest reliability for subscales was reported 0.79–0.91. In the present study, Cronbach's alpha coefficient for the DERS was 0.88**.**

Intolerance of Uncertainty Scale

The Intolerance of Uncertainty Scale (IUS) was developed by Freeston, Rheaume, Letarte, Dugas, and Ladouceur.[45] It is a 27-item self-report instrument scored on a 5-point scale ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). The internal consistency for IUS was reported 0.91. In addition, it has a significant correlation with the PSWQ ($r = 0.63$) and the WDQ ($r = 0.57$).[45] The English version of the IUS has four subscales, including an inability to perform action, uncertainty being stressful and upsetting, unexpected events are negative, and uncertainty about the future. The internal consistency for the English version of the IUS was reported 0.94.[46] Mansouri *et al*.[39] report good internal consistency for IUS (0.93). In addition, the Cronbach's alpha coefficients of the first and second half and the split-half reliability were 0.90, 0.84, and 0.81, respectively. The results of the confirmatory analysis showed good and satisfactory indices (CFI = 0.98, NFI = 0.97, NNFI = 0.97, IFI = 0.98, RFI = 0.96, GFI = 0.88, and RMSEA = 0.067). In the present study, Cronbach's alpha coefficient for the IUS was 0.91.

Results

The mean, standard deviation, and correlations between variables are presented in Table 1. The results of Table 1 shows that there is a strong correlation between the uncertainty of stressful and upsetting with an inability to perform. On the other hand, the relationship between the lack of emotional clarity

Table 1: The mean, standard deviation, and correlations between research of variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1																
2	0.47**	1															
3	0.53**	0.50**	1														
4	0.47**	0.51**	0.47**	1													
5	0.22**	0.23**	0.08	0.26**	1												
6	0.27**	0.14*	0.10	0.22**	0.56**	1											
7	0.24**	0.14*	0.11*	0.17**	0.48**	0.66**	1										
8	0.07	0.13*	0.03	0.07	0.15**	0.14**	0.16**	1									
9	0.32**	0.22**	0.18**	0.18**	0.59**	0.63**	0.66**	0.19**	1								
10	0.08	0.01	0.04	0.02	0.23**	0.21**	0.33**	0.23**	0.28**	1							
11	0.12*	0.24**	0.11*	0.16**	0.39**	0.36**	0.33**	0.18**	0.48**	0.13*	1						
12	0.16**	0.10	0.11*	0.18**	0.42**	0.42**	0.29**	0.12**	0.45**	0.11*	0.68**	1					
13	0.14*	0.10	0.06	0.12*	0.26**	0.32**	0.31**	0.15**	0.39**	0.10	0.62**	0.60**	1				
14	0.09	0.08	0.02	0.19**	0.30**	0.34**	0.26**	0.07	0.43**	0.15**	0.58**	0.55**	0.48**	1			
15	0.12*	0.08	0.06	0.02	0.14*	0.13*	0.27**	0.21**	0.17**	0.19**	0.12*	0.10	0.10	0.03	1		
16	0.19**	0.09	0.06	0.09	0.24**	0.30**	0.27**	0.23**	0.31**	0.30**	0.24**	0.20**	0.27**	0.20**	0.22**	1	
17	0.03	0.12*	0.02	0.04	0.10	0.08	0.10	0.20**	0.09	0.16**	0.20**	0.12*	0.29**	0.17**	0.20**	0.23**	1
Mean	12.72	9.49	21.28	17.94	15.49	16.44	17.64	13.56	22.26	14.22	23.70	25.24	14.17	11.60	1.69	0.68	0.18
SD	4.36	2.88	6.08	4.95	5.78	4.99	5.20	5.89	6.68	3.47	6.77	7.25	4.21	3.36	1.46	0.43	0.11

*P<0.05; **P<0.01. 1: Physical abuse, 2: Sexual abuse, 3: Emotional abuse, 4: Neglect, 5: No acceptance of emotional response, 6: Difficulties engaging in goal- directed behavior, 7: Impulse control difficulties, 8: Lack of emotional awareness, 9: Limited access to emotion regulation, 10: Lack of emotional clarity, 11: Inability to perform action, 12: Uncertainty being stressful and upsetting, 13: Unexpected events are negative, 14: Uncertainty about the future, 15: Self-injury through cutting, 16: Self-injury through burning, 17: Self-injury through tapping

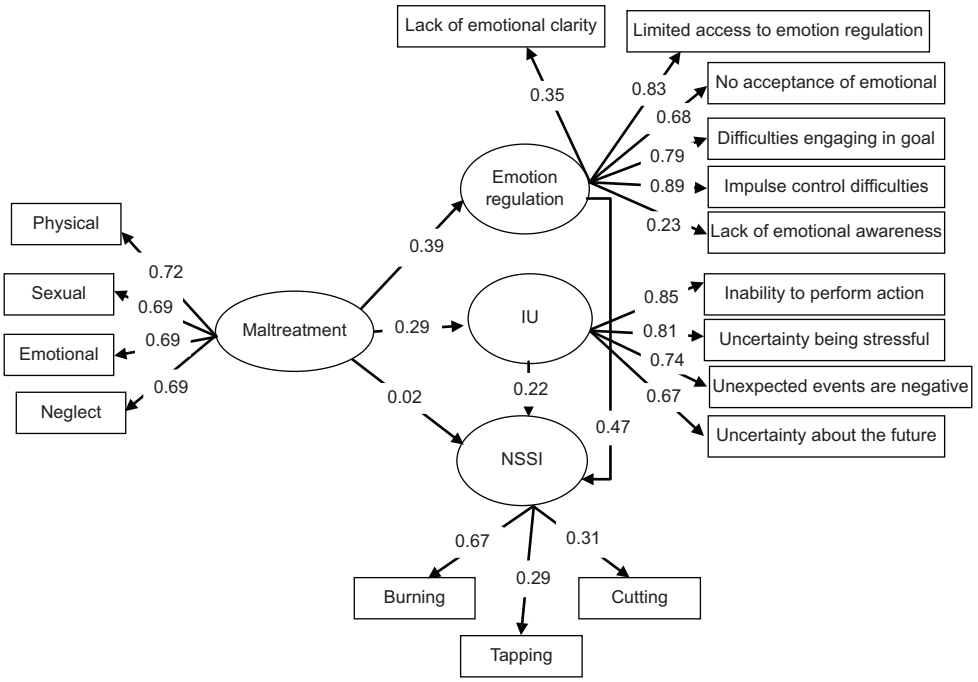

Figure 1: The model of the mediating role of emotion regulation and intolerance of uncertainty in the relationship between childhood maltreatment and nonsuicidal self-injury

and sexual abuse was weak. Structural equation modeling was used in determining the mediating role of emotion regulation and IU in the relationship between childhood maltreatment and NSSI. In Figure 1, the coefficients of the hypothetical model are presented. In Table 2, the direct, indirect, and total effects of variables are presented.

According to the data in Figure 1 and Table 2, the direct effect of childhood maltreatment on emotion regulation (β = 0.39) and IU (β = 0.29) was significant, but on NSSI, it was not significant (β = 0.02). Emotion regulation (β = 0.47) and IU (β = 0.22) have a directly, positively, and significantly effect on NSSI. Furthermore, the indirect effect of childhood

maltreatment on NSSI through emotional regulation and IU was positive and significant (β = 0.24)

Determination of model fit

The results in Table 3 show that the Chi-square, GFI, CFI, NFI, IFI, NNFI, AGFI, RFI, and RMSEA indices equal 306.88, 0.89, 0.93, 0.90, 0.93, 0.92, 0.85, 0.88, and 0.076, respectively. respectively. It is suggested that the fit indices of the model should be higher than 0.90 and the RMSEA should be <0.08.[47] These indices indicate the relative fit of the model to the data.

Because some indices of this model, including CFI and GFI were not appropriate, the model was modified. The coefficients of the modified models are presented in Figure 2. After eliminating the direct path of childhood maltreatment to NSSI and selecting model correction indices, Chi-square, GFI, CFI, NFI, IFI, NNFI, AGFI, RFI, and RMSEA indices equal 18.36, 0.90, 0.94, 0.90, 0.94, 0.92, 0.88, 0.90, and 0.073, respectively. The indices indicate the appropriate fit of the model to the data.

According to the findings, childhood maltreatment can explain 15% of the observed variance of emotion regulation and 8% of the observed variance of IU. Moreover, by the combination of childhood maltreatment, emotion regulation, and IU variables, 30% of the variance of NSSI can be explained.

Discussion

The results showed that emotion regulation and IU are mediators of the relationship between childhood maltreatment and NSSI in adolescents. The results of this study are consistent with the findings of other researches.[3,4,18,19,27,28,48,49] For instance, Karagoz and Dag[49] reported that some difficulties in emotion regulation, such as difficulty engaging in goal-directed

Table 2: The direct, indirect and total effects of variables

Effects	Predictor	Criterion variable	β	SE	*t*	*P*
Direct	Maltreatment	Emotion regulation	0.39	0.07	5.33	<0.01
		IU	0.29	0.07	4.10	<0.01
		Maltreatment	0.02	0.10	0.18	>0.05
	Emotion regulation	NSSI	0.47	0.16	2.92	<0.01
	IU	NSSI	0.22	0.11	2.04	<0.01
Indirect	Maltreatment to NSSI	Through emotional regulation and IU	0.24	0.09	2.79	<0.01
Total	Maltreatment to NSSI	Through emotional regulation and IU	0.26	0.12	2.25	<0.01

SE: Standard error, IU: Intolerance of uncertainty, NSSI: Nonsuicidal self-injury

Table 3: Fitness indices of research conceptual model

Indices	χ^2	df	GFI	CFI	NFI	IFI	NNFI	AGFI	RFI	RMSEA
Fit	306.88	114	0.89	0.93	0.90	0.93	0.92	0.85	0.88	0.076

GFI: Goodness of fit index, CFI: Comparative fit index, NFI: Normed fit index, IFI: Incremental fit index, NNFI: Non-NFI, AGFI: Adjusted GFI, RFI: Relative fit index, RMSEA: Root mean square error of approximation

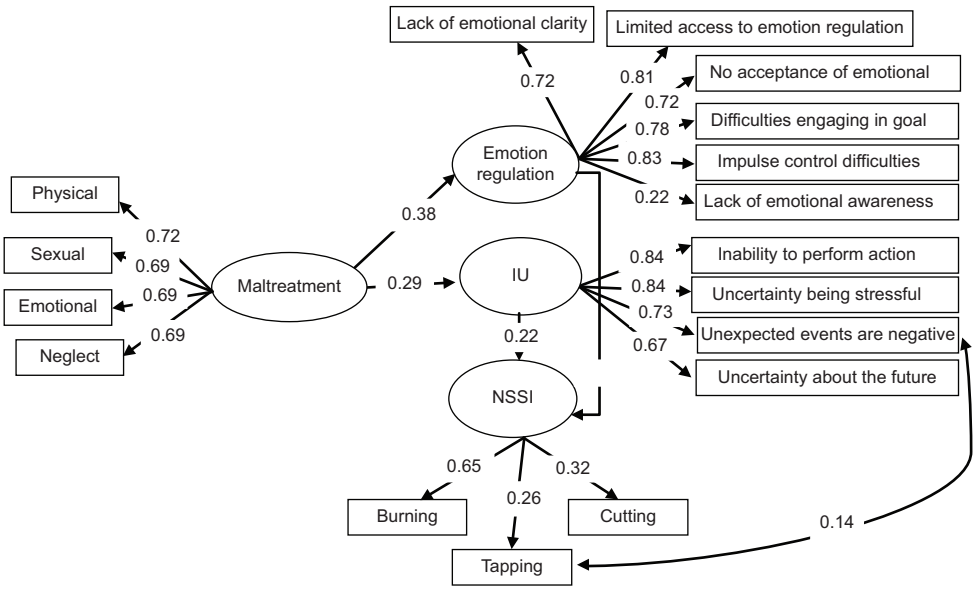

Figure 2: The modified model of the mediating role of emotion regulation and intolerance of uncertainty in the relationship between childhood maltreatment and nonsuicidal self-injury

behavior, impulse control difficulties, and limited access to emotion regulation strategies mediate the relationship between childhood maltreatment and NSSI. Peh *et al*.[18] have shown that NSSI is very common in psychiatry settings. Difficulty in emotion regulation is associated with high levels of self-harm. Difficulty in emotion regulation mediates the relationship between the frequency of self-harm and the exposure to childhood maltreatment. Titelius *et al*.[19] found that physical and emotional (psychological) abuse are related to NSSI, but sexual abuse is not. Moreover, difficulty in emotion regulation mediates the relationship between physical and emotional abuse with NSSI.

In explaining the relationship between childhood maltreatment and NSSI through difficulty in emotion regulation, the results of many studies indicate that childhood maltreatment will pose a threat to the individual's ability in regulating emotion.[18,19,49] As a result, these individuals lack the skill of regulating emotions and may seem nervous and sensitive. They may respond severely to stressful events, and when experiencing painful emotions and negative cognitions, they are prone to substance use, excessive or inappropriate sexual behavior, and self-injury behaviors to reduce the emotions.[50] According to the Yates' developmental model, NSSI is used as a coping strategy for the inability to regulate emotions, which is the result of childhood maltreatment.[14]

The results of the present study in line with previous studes[36] showed that there is a relationship between IU and NSSI. Martin[36] found that IU had a significant relationship with NSSI and eating disorders. The four-function model regarding NSSI, especially automatic negative reinforcement, can explain these results. According to this model, some individuals use NSSI as a safe behavior to regulate negative and intolerant emotions arising from the IU, which itself arises from uncertain situations.[36] This hypothesis is consistent with the emotion cascade model in NSSI. In this model, NSSI is used as an undesirable adaptation mechanism to relieve intolerant negative emotions.[51]

The present study has limitations similar to other studies. Some of the limitations were as follows: (1) the present study was conducted among high school students (adolescents, 14–19 years old) in Kashmar, so cautious is required when generalizing the result to other groups, (2) the data of this study were gathered by self-report measures; therefore, social desirability bias is possible to happen, and (3) this research was a cross-sectional study; consequently, the data reflect only the relationship between variables and not the reasons for it. Overall, the nature of the relationship between childhood maltreatment and NSSI is unclear.

The findings of the study indicated that childhood maltreatment through difficulty in emotion regulation and IU could be a precursor to NSSI. Therefore, the presented study has suggestions for future studies to increase the reliability of the results and reduce the possibility of bias in response: (1) similar studies should be conducted on other ethnic, racial, social, and cultural groups with the aim of increase the generalizability of results, (2) similar studies can be conducted in different age groups to increase the generalizability of results generalized, (3) more longitudinal studies can be done because most of the present studies are cross-sectional and have self-report measures, (4) longitudinal studies examine the common factors and developmental pathways that lead to this behavior during adolescence, (5) in a long term follow-up, the question as to whether NSSI in adolescents can cause borderline personality disorder in adulthood, or it remains an independent syndrome can be answered; a structured clinical interview is recommended for this purpose, and (6) it is recommended to conduct qualitative studies using clinical interviews as well as projection tools to examine the phenomenological experience of adolescents involved in such behaviors.

The findings of the presented study also have implications for the evaluation and treatment of adolescents problems: (1) the risk factors identified in this study can help identify the features of adolescents who engage in NSSI in the areas of identification, evaluation, and diagnosis, (2) since self-harming behaviors are repetitive and habitual in nature, the emotion regulation skills as well as skills to overcome intolerating of uncertainty can prevent of these behaviors. Of course, the therapies such as dialectical behavior therapy that have been applied for these adolescents have these skills.

Conclusions

The results of this study showed that emotion regulation and IU mediate the relationship between childhood maltreatment and NSSI in adolescents. Therefore, it is crucial that the researchers, specialists, and therapists take these variables into account when dealing with adolescent students in counseling and treatment centers.

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Conflicts of interest

There are no conflict of interest.

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