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Examining the Role of Theory of Mind and Emotion Regulation in Predicting Self-harming Behaviors in Adolescents

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Abstract

Background: Self-harm has emerged as a significant concern within the realm of public health, particularly during the adolescent years, where such behaviors have witnessed a notable escalation.

Objectives: This study aims to explore the influence of the theory of mind and emotion regulation in the anticipation of self-harming tendencies among adolescents.

Methods: The study was conducted using both correlational and cross-sectional design. The target population for this research consisted of all adolescents residing in Tehran from April to November 2023 who had previously engaged in self-harming actions. The target population encompassed all teenagers in Tehran with a history of self-harming behaviors. A sample of 89 teenagers with such a history was selected through the purposive sampling method. The research employed several measurement instruments, including the Theory of Mind Scale, the Cognitive Emotion Regulation Questionnaire, and the Self-Harm Inventory. The collected data were analyzed in SPSS version 27 software using Pearson correlation and multiple regression techniques. The significance level for this research was set at 0.05.

Results: The current study findings indicated that the initial statement of the theory of mind had no significant impact on self-harm (P=0.593). However, the components of the Introductory Theory of Mind (P=0.001) and Advanced Aspects of the Theory of Mind (P=0.009) had a detrimental and significant influence on self-harm.

Conclusion: Regarding the components of the theory of mind, the introductory theory of mind and more advanced aspects have a mitigating effect on self-harm in teenagers who engage in self-harming behaviors.

Keywords: Adolescents, Emotion regulation, Self-Harm behavior, Theory of mind

1. Background

Adolescence is a phase characterized by notable transformations in physical, emotional, and social aspects, which affect the process of growth. During this phase, teenagers might come across circumstances that pose potential dangers (1). The term “self-harm” encompasses a broad range of behaviors and intentions, including but not limited to instances of attempted hanging, impulsive self-poisoning, and superficial cutting that occur as a response to unbearable tension. Similar to suicide, rates of self-harm display considerable variation among different countries. In Western countries, approximately 5-9% of adolescents

reveal having engaged in self-harm behaviors within the preceding year. Contributing factors to this behavior include socio-economic disadvantage and psychiatric ailments, particularly depression, substance abuse, and anxiety disorders (2).

Self-harm and suicide are significant public health concerns among adolescents, with high rates of self-harm occurring during the teenage years and suicide being the second leading cause of death among young people worldwide. Various factors, including genetic vulnerability and psychiatric, psychological, familial, social, and cultural influences, contribute to self-harm and suicide (3). The World Health Organization defines self-harm as intentionally engaging in non-fatal acts or excessive use of legal or illegal substances that result in harming oneself without the involvement of others (4). Self-harm serves as a strong indicator of suicide attempts in adolescents and is more prevalent in this age group compared to early childhood, typically beginning around the age of 12 (5).

Research conducted on a population scale has revealed that around 10-20% of adolescents who purposefully harm themselves seek medical attention for their actions (6). Various psychosocial factors have been identified as risks for self-harm and suicide, including socio-economic disadvantage, social isolation, ongoing emotional distress, mental disorders, and family position. Among these risk factors, cognitive ability (intelligence) has been linked to both self-harm and suicide risk (7). Cognitive emotion regulation strategies refer to the adaptive and maladaptive cognitive methods used to regulate emotional experiences. Previous studies have indicated that difficulty in regulating emotions is associated with multiple psychiatric issues and risky behaviors. It is widely recognized that poor emotion regulation is a fundamental process underlying non-suicidal self-injury (NSSI). Additionally, emotional regulation has been linked to aggression, with significant positive connections found between emotional dysregulation and aggression in adults and adolescents (8).

Qian et al. (2022) found that patients with major depressive disorder who were engaged in NSSI had a higher prevalence rate of mental illness in their family, more exposure to childhood maltreatment and stressful life events, more severe depression symptoms, less utilization of adaptive coping strategies, and more utilization of maladaptive coping strategies (9). Furthermore, Madjar et al. (2019) analyzed covariance, controlling for gender and depression symptoms, and discovered that students who engaged in NSSI reported higher levels of acceptance but lower levels of refocus on planning and gaining perspective (10). Additionally, Dour et al. (2011) conducted t-tests and Chi-square tests and found that individuals who had made a recent suicide attempt within the past year did not differ from those who did not attempt suicide in terms of age, gender, race, or presence of current psychiatric disorders, except for the presence of a mood disorder and various psychiatric disorders. Problem-solving skills were not associated with either emotional reactivity or a recent suicide attempt (11). In their study conducted in 2023, Chen et al. showed that the self-harm group performed significantly worse in executive function and working memory compared to the control group. The executive function of the self-harm group was found to be negatively affected by their depression score, while the cognitive functioning of the NSSI group was linked to borderline traits and rumination (12-18).

Furthermore, Laghi et al. (2016) discovered that individuals who partake in NSSI displayed substandard levels of performance in the control group across all examined aspects of the Theory of Mind (ToM). Moreover, their study revealed a negative association between ToM performance and attraction to death, encompassing the type and frequency of self-harm behavior, while displaying a positive correlation with attraction to life (19). In a separate study conducted by Moon et al. (2022), no significant variations were observed between the groups in terms of demographic

data (such as age, gender, education, estimated IQ, and handedness), as well as accuracy in both the Reading the Mind in the Eyes Test and control conditions. However, individuals with NSSI exhibited significantly higher scores in alexithymia, emotion dysregulation measured by the Difficulties in Emotion Regulation Scale, and suicide ideation as measured by the Brief Symptom Inventory when compared to the control group. Moreover, no discrepancies were found between the groups in terms of handedness as assessed by the Edinburgh Handedness Inventory (20).

Numerous studies have thus far been conducted in the realm of adolescent self-harm. As stated in this piece of writing, the influence of emotional and psychological theories on these young individuals is significant. Non-suicidal self-injury is a multifaceted behavior predominantly employed as a means of regulating emotions. Consequently, several theoretical frameworks about the origins and perpetuation of NSSI are rooted in models of emotion regulation, although the extent to which cognition influences this behavior has remained less understood. Nevertheless, no research has yet explored the interconnections between these factors. Given the critical significance of this topic, it is essential to undertake a more comprehensive investigation.

2. Objectives

Thus, the primary objective of this study is to assess emotional recognition and ToM among adolescents who engage in self-harming behaviors.

3. Methods

This study was observational and conducted at a single point in time. The target population consisted of all adolescents residing in Tehran from April to November 2023 who had engaged in self-harming actions in the past.

The study sample consisted of 100 student adolescents who were selected based on their previous self-harming behaviors. The sample size for the research was calculated using Tabacnik and Fidel's formula, which advises using eight times the number of predictor variables plus 50 for correlation studies (21).

$$n \geq 50 + 8M$$
$$50 + 2*8 = 66$$

The researcher determined that a sample size of 66 individuals would be sufficient; however, they opted to increase it to 100 to account for the sensitivity and vulnerability of the participants. The authors chose the desired sample using the purposive sampling technique.

The study required participants to meet numerous criteria, such as having a documented history of self-harming behaviors in the psychological field, obtaining informed consent from the teenagers and their parents to participate in the research, and having sufficient literacy and comprehension skills to respond to the questions. On the other hand, individuals who were above 19 years old, had any physical or mental condition that hindered their ability to answer the questions, failed to answer more than eight items in the questionnaires, or withdrew voluntarily from the study were excluded from the research.

The research was carried out using the following procedure: initially, the researcher received the required permits from the university they were enrolled in. Subsequently, assistance from university professors helped introduce the researchers to five psychology and counseling clinics in Tehran. To keep the information anonymous, the names of the clinics were kept confidential. These specific clinics were chosen due to their ease of coordination and suitability for conducting the research. In addition, they were selected based on their ability to connect with teenagers who are in danger.

Afterward, the researchers visited the clinics and collaborated with the clinic's management department to carry out the study. Following this, a message was sent on behalf of the psychological clinics to the families who had children with a past of harmful behavior and

had received counseling and treatment at the research clinics. The message invited them to engage in the research. Once the parents of the teenagers gave their consent, a more detailed explanation of the inquiry was sent to them electronically, utilizing social media platforms.

The information included the objectives of the research, obtaining permissions, and adhering to ethical principles. Participants were assured that none of the research forms contained their personal information and that they could withdraw from the study if they wished to. The research and completion of the online questionnaires took four months because of limitations in parental cooperation. Of the 100 questionnaires that were completed, 89 were utilized for analysis, whereas 11 were eliminated because of incomplete or deliberately inaccurate answers. The researcher conducted the ToM questionnaire through an interview and obtained the necessary information from self-harming teenagers via online video contact. However, other research questionnaires were self-reported and completed online.

Measures

Theory of Mind Scale: The ToM questionnaire, developed by Steerneman et al. (1999), is a 78-item scale designed to assess the ToM in typical children and adolescents, as well as those with pervasive disorders. Its validity has been confirmed (22). This questionnaire examines an individual's social understanding, sensitivity, insight, and ability to empathize with others' thoughts and feelings. The main assessment included 78 items and was divided into three subscales: an introductory understanding of the ToM (29 items), a basic overview of a precise ToM (33 items), and more intricate aspects of the ToM (16 items). It is administered as an interview, with each correct answer earning 1 point and each incorrect answer earning 0 points. The scores for the subscales range from 0 to 29 (first subscale), 0 to 33 (second subscale), and 0 to 16 (third subscale). The reliability coefficient of the scale is reported to be 0.72, while its concurrent validity is 0.89, and its content validity is 0.96 (23). The internal consistency was assessed using Cronbach's alpha coefficient and found to be 0.86, 0.72, 0.80, and 0.81 for the whole scale and the subscales, respectively (24). In this study, the Cronbach's alpha coefficient for the scale was determined to be 0.77.

Cognitive Emotion Regulation Questionnaire: This self-report questionnaire was developed in 2002 by Garnowski to measure cognitive emotion regulation (25). This questionnaire is a 36-item scale, and the replies to this tool are rated on a 5-point Likert scale (from always to never). This questionnaire has nine main factors. In Iran, this questionnaire has been validated, and based on research, seven main subscales were identified in this questionnaire (26). These subscales include Self-blame (including 3 items), Other blame (including 4 items), Rumination (including 5 items), Catastrophizing (including 4 items), Acceptance (including 4 items), as negative factors, and Positive refocusing (including 8 items) and Positive reappraisal (including 4 items) as positive factors. Each subscale in this questionnaire is calculated separately. In Iran, Cronbach's alpha coefficient of this scale was found to be 0.89 (27). In this research, the researcher obtained Cronbach's alpha coefficient of this scale equal to 0.84.

Self-Harm Inventory: The Self-Harm Inventory was created by Sansone et al. (1988) to assess the participants' self-harm behavior (28). This 22-item tool utilizes the Likert scale to gauge self-harming tendencies, such as engaging in negative self-blame. The scoring system for the questionnaire consists of "yes" and "no" responses, where a score of 1 is assigned to affirmative answers, indicating intentional or self-harming acts, while a score of 0 is recorded for negative responses. Individuals who obtain a total score of 5 or higher on this questionnaire are 85% likely to have borderline personality disorder. The overall score for this

questionnaire is obtained by summing up the affirmed responses. Negative responses do not contribute to the scoring process (29). The maximum achievable score on this questionnaire is 22. In an Iranian research study, Cronbach's alpha coefficient for this questionnaire was determined to be 0.71 (30). Furthermore, the researcher of this study reported the Cronbach's alpha coefficient of 0.76 for this scale.

Statistical analyses

Data analysis was conducted in SPSS version 27 software using the Pearson correlation and multiple regression methods. The normality of the distribution of research variables was assessed by employing the Kolmogorov-Smirnov test. Additionally, the researcher's sampling method adhered to the principle of randomness, fulfilling the necessary assumption. The level of significance for this research was determined to be 0.05.

4. Results

In this research trial, comprising a sample size of 89 adolescents who engaged in self-harm behaviors, the participants were allocated into two distinct categories: males (61.8%) and females (38.2%). Moreover, the adolescents were further segregated into three age groups encompassing individuals aged 15 to 16 years old (75.3%), 16 to 17 years old (12.4%), and 18 to 19 years old (12.4%). Similarly, regarding the nature of self-harm behaviors committed by the teenagers, they were appraised across seven distinct categories: self-harm via cutting, burning the skin, infliction of deliberate physical aggression towards oneself, plucking of hair, engaging in hazardous activities with clear conscious intent, the act of punching oneself or a surface, and other reasons (Table 1, Table 2) provides a comprehensive overview of the mean and standard deviation values pertaining to the research variables.

Table 1. Description of the demographic variables

Variables	Groups	Frequency	Percent	Total	Median
Gender	Boy	55	61.8%	89	1
	Girl	34	38.2%		
Age	15 to 16	67	75.3%	89	1
	16 to 17	11	12.4%		
	18 to 19	11	12.4%		
Type of self-harm	Self-harm by cutting	14	15.7%	89	4
	Burning skin	14	15.7%		
	Hitting or biting	13	14.6%		
	Plucking hair	12	13.5%		
	Deliberately engaging in physically hazardous behaviors	13	14.6%		
	Punching oneself or a wall	14	15.7%		
	Other reasons	9	10.1%		

Table 2. Descriptive statistics of the variables

Variables	Mean±SD	n	Max	Min
Introductory theory of mind	17.8427±5.07	89	10	26
First statement of the true theory of mind	20.7978±7.05	89	10	31
Advanced aspects of the theory of mind	9.4719±3.64	89	4	14
Self-blame	9.191±2.875	89	5	13
Other blame	12.6404±5.53	89	5	18
Rumination	10.5843±3.37	89	7	20
Catastrophizing	12.1461±5.54	89	5	18
Acceptance	8.7978±2.82	89	5	13
Positive refocusing	17.2584±4.99	89	10	26
Positive reappraisal	14.7416±3.19	89	8	19
Self-harm	7.7528±2.242	89	2	11

According to the findings presented in Table 3, the correlation coefficients determined between the different aspects of the TOM, such as an introductory TOM, the first statement of the true TOM, and advanced aspects of the TOM, demonstrate a significant negative association with self-harm (P>0.001). On the other hand, the negative components of emotion regulation, such as Self-blame, Other blame, Rumination, Catastrophizing, and Acceptance, exhibit a significant positive relationship with self-harm (P<0.001). Conversely, the positive aspects of emotion regulation, including positive refocusing and positive reappraisal, display a significant negative correlation with self-harm (P<0.001).

Table 4 presents the findings of the multiple regression analysis. Accordingly, the first statement of the true ToM had no statistically significant impact on self-harming behavior (P=0.593). However, the aspects related to the introductory ToM (P=0.001) and the advanced aspects of the ToM (P=0.009) demonstrated a negative and significant influence on self-harm. Referring to Table 4, the obtained F-value for examining the regression model equaled 24.602, which was highly significant at a significance level of less than 0.001. This value not only exemplifies the effectiveness of the ToM in elucidating the multifaceted aspect of relationships but also validates the credibility of the proposed regression model. The significance of this value goes beyond demonstrating that the ToM adequately explains the differences in relationships; it also confirms the suitability of the regression model proposed. The R-squared value, amounting to 0.465, highlights that the ToM explains 46.5% of the variance in self-harm. Furthermore, in Table 5, the researcher explores the regression connections between the dimensions of emotion regulation and self-harm.

Table 3. Pearson's correlation coefficient

Variables	1	2	3	4	5	6	7	8	9	10	11	P-value
Introductory theory of mind	-											P<0.001
First statement of the true theory of mind	0.676	-										P<0.001
Advanced aspects of the theory of mind	0.748	0.648	-									P<0.001
Self-blame	-0.415	-0.284	-0.420	-								P<0.001
Other blame	-0.529	-0.652	-0.557	0.316	-							P<0.001
Rumination	-0.499	-0.629	-0.569	0.171	0.552	-						P<0.001
Catastrophizing	-0.603	-0.523	-0.618	0.379	0.557	0.433	-					P<0.001
Acceptance	-0.725	-0.601	-0.831	0.559	0.552	0.557	0.627	-				P<0.001
Positive refocusing	0.385	0.428	0.216	-0.269	-0.432	-0.508	-0.211	-0.401	-			P<0.001
Positive reappraisal	0.597	0.625	0.524	-0.207	-0.473	-0.410	-0.417	-0.463	0.415	-		P<0.001
Self-harm	-0.648	-0.453	-0.623	0.527	0.466	0.492	0.439	0.769	-0.590	-0.482	-	P<0.001

Table 4. Multiple regression analysis for the theory of mind variable

		Unstandardized coefficients		Standardized coefficients			Model Summary			ANOVA
Dependent variable	Model	B	Standard error	Beta	t	P-value	R	R^2	F	P-value
Self-harm	Constant	12.757	0.667		19.136	0.000	0.682	0.465	24.602	P<0.001
	Introductory theory of mind	-0.194	0.057	-0.439	-3.396	0.001				
	First statement of the true theory of mind	0.019	0.036	0.060	0.536	0.593				
	Advanced aspects of the theory of mind	-0.205	0.077	-0.334	-2.674	0.009				

Table 5. Multiple regression analysis for the emotion regulation variable

		Unstandardized coefficients		Standardized coefficients		Model Summary		ANOVA		
Dependent variable	Model	B	Standard error	Beta	t	P-value	R	R^2	F	P-value
Self-harm	Constant	6.773	1.364		4.965	0.000	0.840[a]	0.705	27.719	P<0.001
	Self-blame	0.101	0.059	0.130	1.709	0.091				
	Other blame	-0.019	0.034	-0.047	-0.553	0.582				
	Rumination	-0.006	0.056	-0.010	-0.114	0.909				
	Catastrophizing	-0.025	0.034	-0.061	-0.724	0.471				
	Acceptance	0.470	0.079	0.593	5.990	0.000				
	Positive refocusing	-0.140	0.034	-0.312	-4.115	0.000				
	Positive reappraisal	-0.072	0.052	-0.103	-1.388	0.169				

According to Table 5, it can be confirmed that the Acceptance component of emotion regulation has a positive and significant impact on the Self-harm variable (P<0.001), indicating that Acceptance increases self-harming behaviors in adolescents. Similarly, the Positive refocusing component has a negative and significant effect on the Self-harm variable (P<0.001), demonstrating that positive refocusing reduces self-harming behaviors among teenagers. However, the components of Self-blame, Other blame, Rumination, Catastrophizing, and Positive reappraisal were found to be insignificant in the regression model (P<0.05). Table 5 also shows that the F-value obtained for the regression model analysis is 27.719, which is significant at a level of less than 0.001. This value demonstrates that the Acceptance and Positive refocusing components effectively explain the changes in the relationship with Self-harm, validating the presented regression model. Additionally, the R square value of 0.705 indicates that the Acceptance and Positive refocusing components account for 70.5% of the variance in Self-harm.

5. Discussion

This study aimed to investigate how ToM and emotion regulation play a role in predicting self-harming behaviors in adolescents. The results showed that the first statement of the true ToM had no significant effect on self-harm; however, the introductory ToM and advanced aspects of the ToM had a negative and significant effect, explaining 46.5% of the variance in self-harm. In terms of emotion regulation, the acceptance component had a positive and significant effect on self-harm, while the positive refocusing component had a negative and significant effect, reducing self-harm

behaviors. The components of self-blame, other-blame, rumination, catastrophizing, and positive reappraisal had no significant effect. Overall, positive acceptance and refocusing components explained 70.5% of the variance in self-harm.

These findings are consistent with previous research (19, 31-33), which also found a negative impact of the introductory ToM and advanced aspects of the TOM on self-harm. One study found a negative relationship between ToM performance and attraction to death and a positive relationship with attraction to life. Another research study found that ToM components were the basis for self-harm and could predict self-harm behaviors in adolescent girls aged 14 to 18. Additionally, an investigation by Huang et al. (2022) suggested that damage to the ToM components might be a risk factor for NSSI behavior in adolescents with depressive disorder. Another study found that individuals with a history of NSSI experienced higher levels of negative effects and had lower mentalizing abilities compared to their peers (33).

The explanation of this finding involves the confirmation that the ToM is a sophisticated skill that grants us the ability to comprehend that individuals possess mental states and that these mental states forecast their actions. From this perspective, the ToM aids us in foretelling individuals' potential future behaviors (18). Individuals who lack the ToM cannot grasp the emotions and thoughts of others, cannot achieve a correct comprehension of the intentions and mental states of others, and encounter significant difficulties in predicting the thoughts of others. Failing to receive the ability linked to the ToM or recognizing social interaction erroneously by generating flaws in attributing beliefs, desires, intentions, and emotions to oneself and others can result in instability in interpersonal relationships, mood, and so forth for these individuals (34). Nevertheless, since the ToM permits the psychological and symbolic depiction of one's internal state while assisting in regulating and controlling one's emotions, an increased state of mindfulness, characterized as attentiveness to the current experience, might aid in alleviating symptoms of self-injury without suicidal intent in adolescents (19).

Furthermore, previous research (10, 35-37) suggests that acceptance has a positive impact on self-harm, while positive refocusing has a negative effect. In a study aimed at examining the influence of various emotion regulation strategies on emotional distress and the inclination towards self-harm, the results revealed that acceptance plays a significant role in alleviating short-term unpleasant internal experiences (35). Additionally, research findings revealed that individuals who engage in NSSI exhibit higher levels of acceptance (10). Another study highlighted the connection between emotion regulation, resilience, and mental health components in students with self-harming behaviors (36). Moreover, it was determined that maladaptive emotion regulation strategies can serve as predictors for emotional disorders in soldiers with a history of self-harm behaviors (37).

The role of emotion regulation in adapting to life's events and challenges is significant, as it involves controlling, assessing, and regulating emotional interactions both internally and externally. Interfering with this regulation can result in negative consequences, such as incompatibility, aggression, anger, hatred, anxiety, and threats to mental and emotional well-being (38). Individuals who engage in self-harm often experience higher levels of emotion dysregulation compared to those who do not. Emotional dysregulation may serve as a crucial pathway in the development of self-harm among individuals with psychological disorders. When combined with negative emotional experiences, emotional dysregulation can drive individuals to resort to self-harm as a temporary escape from unpleasant situations or feelings. The relief provided by self-harm can reinforce the behavior and establish it as a conditioned

response to negative emotions (8).

Most individuals engage in self-harm as a means to alleviate intense emotional pain, such as anxiety and tension. These individuals often struggle with dysfunctional emotional regulation and have difficulty understanding the thoughts and emotions of others (19). People who employ maladaptive cognitive strategies for regulating their emotions are more likely to engage in self-harm and exhibit suicidal tendencies. However, when teenagers use positive emotion regulation strategies to reframe negative events, they view these events more positively, which leads to reduced feelings of depression and despair, ultimately making them less susceptible to self-harm and suicidal thoughts (38).

The current study faced several limitations. Despite assuring confidentiality and voluntary participation, there is a likelihood of under-reporting due to the sensitive nature of self-harm. Additionally, some teenagers were reluctant to engage in the research due to the sensitivity of the topic. Furthermore, the study's findings may be limited to the research sample and society, and the differences in emotional expression between boys and girls, as well as the reliance on self-reported data, limiting the generalizability of the results. Therefore, it is recommended that similar studies be conducted in different geographical areas with larger sample sizes to increase the generalizability of the findings.

6. Conclusion

In conclusion, the results of this study demonstrated that ToM accounted for 46.5%, and components of positive acceptance and refocusing formed 70.5% of the variability in self-harm behaviors. Introductory ToM and advanced aspects of ToM decrease self-harm among self-harming teenagers. However, the acceptance component of emotion regulation increases self-harm, while the positive refocusing component decreases self-harm in these individuals. Therefore, based on the traumatic nature of self-harm, it is suggested that teenagers receive training in emotion regulation and that schools and mental health professionals work to enhance the ToM among teenagers.

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