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Effectiveness of Mentalization Training on Emotion Regulation and Aggression in Adolescent

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ABSTRACT

Objective: This study aimed to evaluate the effectiveness of a mentalization-based intervention in improving emotion regulation and reducing aggression among adolescent boys and girls.

Methods and Materials: A quasi-experimental pretest-posttest control group design with a 3-month follow-up was implemented. A total of 60 first-year secondary school students (30 boys and 30 girls), aged 13 to 15, were selected via cluster random sampling in Arak, Iran. Participants were randomly assigned to an experimental group (received eight sessions of mentalization training) and a control group. Emotion regulation was assessed using the Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA), and aggression was measured using the Buss and Perry Aggression Questionnaire. Data were analyzed using repeated measures ANOVA in SPSS v27.

Findings: Mentalization training significantly increased cognitive reappraisal and decreased emotional suppression and all subtypes of aggression (physical, verbal, anger, and hostility) in the experimental group ($p < 0.05$). These effects were sustained at the 3-month follow-up. Gender differences were found only in suppression and verbal aggression, with boys scoring higher. The interaction effect of group and gender was significant for suppression and some aggression subtypes.

Conclusion: Mentalization training is an effective intervention for enhancing emotion regulation and reducing aggressive behaviors in adolescents. It shows promise for implementation in school-based psychological services. The findings also highlight gender-specific patterns in emotional and behavioral outcomes, suggesting a need for tailored interventions.

Keywords: Mentalization, Emotion Regulation, Aggression, Adolescents, School-Based Intervention.

Introduction

To date, adolescence has been recognized as a high-risk period for the development of various psychiatric disorders; therefore, the mental health of adolescents should be the primary goal of any preventive program (Griffin & McMahon, 2020). Adolescents may experience a wide range of emotions, often in an "all-or-nothing" manner—meaning they experience emotions in extreme ways and rapidly shift emotional states in response to environmental, social, and internal factors (Di Berardis et al., 2020).

This does not necessarily mean that such occurrences should always be considered an indicator of mental disorder; however, emotion regulation difficulties may be associated with a range of impulsive behaviors and reactions (Bjoriberg et al., 2023; Goudarzi & Crowin, 2024). Emotion regulation refers to a set of actions that individuals (consciously or unconsciously) take to influence their emotional experiences (Gross & Jazayeri, 2014). Emotion regulation can be adaptive or maladaptive (i.e., it can enhance or impair individuals' functioning or internal experiences) (Gross, 1998).

Specifically, the use of adaptive strategies decreases from childhood to adolescence and increases in late adolescence into adulthood, whereas the use of maladaptive strategies increases from childhood to adolescence and then declines in late adolescence into adulthood (Krakow et al., 2017). This relative delay in the use of adaptive coping strategies in early to mid-adolescence arises because biological changes during this developmental period lead to an increase in the frequency and intensity of negative emotions, but cognitive capacity has not yet developed sufficiently to effectively regulate such emotions.

This mismatch between strong emotions and the use of emotion regulation strategies (high maladaptive and low adaptive regulation) may partially explain the emergence and persistence of psychological problems in adolescents (Krakow et al., 2017; Rubin et al., 2023). Additionally, adolescents with childhood trauma experiences and high levels of insecure attachment report greater difficulties in regulating emotions (Mikulincer & Shaver, 2019; Sharma et al., 2024). Cross-sectional studies have shown that greater use of maladaptive strategies such as avoidance (Hoffman & Hay, 2018) and rumination (Jandrek et al., 2023) is associated with the development of psychopathology in adolescents.

In contrast, the use of adaptive emotion regulation strategies, such as cognitive reappraisal, is associated with fewer depressive symptoms and higher quality of life (Cocconi et al., 2024; Srip et al., 2022). It appears that the detrimental effects of maladaptive emotion regulation strategies on psychopathology are stronger than the protective effects of adaptive emotion regulation strategies (Zsigo et al., 2023). Focusing on the use of specific emotion regulation strategies, studies suggest that girls are more likely to use both adaptive strategies (such as reappraisal and active coping) and maladaptive strategies (such as rumination and suppression) (Chaplin & Aldao, 2013).

Among mental health problems associated with emotion regulation, aggression has recently gained increased research attention (Garofalo et al., 2018; Bonnoit et al., 2022). Aggression is an intentional act aimed at causing harm to oneself, others, or the environment, either physically or verbally (Chandler & Lawrence, 2022), and it can result in physical and psychological harm (Medeiros et al., 2019).

Verbal aggression is more frequently perpetrated and experienced by adolescents (Worth et al., 2021). Verbal aggression is expressed directly and indirectly through anger and hostility, leading to negative thinking, damage to integrity and social relationships, threats to security, and harm to the well-being of children, adolescents, and adults (Archer & Coyne, 2005). Physical aggression includes punching, kicking, shooting, or even killing (Stormy et al., 2017). Aggression is associated with potential mental health issues (Worth et al., 2021). Experiencing victimization through physical aggression is likely to lead to future aggressive behaviors (Waller et al., 2018).

Other consequences of aggression include negative thinking, insecurity, death, and mental disorders such as maladjustment, hopelessness, depression, suicidal behavior, and alcoholism (Edwards et al., 2019; Worth et al., 2021). Summarizing the discussed points, individuals prone to emotion regulation difficulties (i.e., lower capacity for emotion regulation) are at high risk for aggressive behavior (Garofalo et al., 2018; Bonnoit et al., 2022). Furthermore, both emotion regulation and aggression impose multiple negative consequences on adolescents' mental health. If these factors are not

addressed therapeutically, they may escalate into more severe psychological problems. Therefore, it is crucial to identify and understand the relationships between these variables and develop effective interventions to enhance emotion regulation strategies and reduce aggression in adolescents.

One promising evidence-based approach to addressing aggression is Mentalization-Based Therapy (MBT) (Bateman & Fonagy, 1999)—a structured psychotherapy specifically developed for borderline personality disorder (Stoffers-Winterling & Lieb, 2022). The goal of mentalization training is to enhance clients' mentalization skills to improve their functioning in daily social interactions and achieve a higher quality of life (Fonagy et al., 2018; Richel & Kayes, 2021). This means that in the mentalization process, individuals focus on the mental states of those they interact with, whether physically or psychologically (Bateman & Fonagy, 2010; 2008).

The effectiveness of mentalization training has been confirmed in various studies. For example, Basharpour & Eyni (2020) confirmed the effectiveness of Mentalization-Based Therapy (MBT) in reducing emotional dysregulation and impulsivity in veterans with post-traumatic stress disorder (PTSD). According to Midgley et al. (2023), Mentalization-Based Therapy (MBT) is a well-established treatment designed to enhance mentalization, thereby increasing emotion regulation capacity and reducing emotional and behavioral problems. Findings from a study by Mohajerin & Howard (2024) showed that individuals undergoing MBT reported significantly fewer symptoms of psychosis and emotional disorders.

Regarding aggression, research conducted by Ghafari Cherati et al. (2023) demonstrated that Mentalization-Based Therapy (MBT) was effective in reducing difficulties in emotion regulation and aggression among adolescent girls with depression. A study on adolescents with conduct disorder found that developing mentalization capacity for social interactions—which prevents non-mentalized and aggressive behavior—may help individuals with conduct disorder exhibit more adaptive behaviors (Taubner et al., 2021). Similar results have been reported in studies by Darabi et al. (2022) and Ahmadi et al. (2023). In conclusion, the high prevalence of self-harming and aggressive behaviors among adolescents in recent decades underscores the urgent need for effective treatments that are widely accessible.

Although several interventions for aggressive behavior (Calvin et al., 2024) and emotion regulation (Saccaro et al., 2024) have demonstrated relative efficacy in randomized controlled trials, a significant concern is that most of these treatments require extensive training and are not readily accessible to many individuals. Mentalization training was developed to address this need, and it is believed that many problematic situations can be modified through mentalization mechanisms, leading to symptomatic and personality changes with relatively simple techniques (Bateman & Fonagy, 2010). In line with this perspective, the present study aims to investigate the effectiveness of Mentalization-Based Training as a clinically viable and cost-effective intervention for improving emotion regulation and reducing aggression in adolescent boys and girls.

Methods and Materials

Study Design and Participants

This study was applied in purpose and semi-experimental in methodology, using a pretest-posttest design with an experimental and control group, and a three-month follow-up period. The statistical population consisted of all male and female first-year secondary school students in public and private schools in Arak during the 2023-2024 academic year. The sample group included 60 eligible and willing students (30 female and 30 male students), selected through cluster random sampling with the assistance of school counselors. These students were randomly assigned to experimental and control groups (each group consisting of 30 students (15 in the experimental group and 15 in the control group)).

The inclusion criteria included at least one instance of self-harming behavior in the past year, age between 13 and 15 years (Blos (1962) identified the core of adolescence as occurring between ages 13.4 and 20; therefore, based on the study objectives, the researcher selected ages 13 to 15 as the target age range), no psychological disorders based on a clinical interview and psychological disorder test, a score at least one standard deviation above the mean (87) on the Buss and Perry Aggression Questionnaire (1992), and informed consent to participate in the training sessions. The exclusion criteria were absence for more than two sessions during the intervention and unwillingness to continue participation.

Ethical considerations included informed consent from participants, confidentiality, and ensuring no harm to participants. Additionally, this study was approved by the Ethics Committee of Arak University of Medical Sciences under the code IR.IAU.ARAK.REC.1403.177.

Instruments

The Emotion Regulation Questionnaire for Children and Adolescents is a 10-item tool developed by Gross & John (2003). It measures two primary emotion regulation strategies: cognitive reappraisal and suppression. Each item is rated on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). The score range for cognitive reappraisal is 6 to 70, and for suppression, it is 4 to 36. Higher scores indicate greater use of the respective strategy. Gross & John (2003) reported Cronbach's alpha reliability of 0.79 for reappraisal and 0.73 for suppression, with a three-month test-retest reliability of 0.69 for both subscales. Convergent validity with the Depression Scale was 0.26 for reappraisal and 0.37 for suppression (Goloni & Tafi, 2012). In Iran, Lotfi et al. (2019) assessed the Farsi version, reporting: Cronbach's alpha of 0.81 for the total questionnaire, 0.79 for reappraisal, and 0.68 for suppression. Convergent validity was confirmed with Positive and Negative Affect Scale for Children (r = 0.47), Children's Depression Questionnaire (r = 0.71), and Spence Children's Anxiety Questionnaire (r = 0.53). In this study, Cronbach's alpha reliability was 0.78 for reappraisal and 0.71 for suppression, while the three-month test-retest reliability was 0.70 for reappraisal and 0.72 for suppression.

The Buss & Perry Aggression Questionnaire (1992) is a 29-item tool designed to assess aggressive behaviors in adolescents and young adults. It evaluates four types of aggression: physical aggression, verbal aggression, anger, and hostility. Participants respond using a 5-point Likert scale (1 = not at all like me to 5 = very much like me). Items 9 and 16 are reverse-scored. The total aggression score is obtained by summing the subscale scores, where higher scores indicate greater aggression. Buss & Perry (1992) reported test-retest reliability over nine weeks as 0.80 for physical aggression, 0.76 for verbal aggression, 0.72 for anger, and 0.72 for hostility. Internal consistency (Cronbach's alpha) was 0.85 for physical aggression, 0.72 for verbal aggression, 0.83 for anger, 0.77 for hostility, and 0.89 for total aggression. Divergent validity showed a strong correlation between verbal and physical aggression (r = 0.45), anger and physical aggression (r = 0.48), anger and verbal aggression (r = 0.48), and anger and hostility (r = 0.45). In Iran, Samani (2008) found a high correlation between anger (r = 0.73), aggression (r = 0.76), resentment (r = 0.67), and distrust (r = 0.65) with the total score, confirming good concurrent validity. Test-retest reliability was reported at 0.78. Internal consistency (Cronbach's alpha) was 0.83 for anger, 0.79 for aggression, 0.77 for resentment, and 0.70 for distrust. In this study, Cronbach's alpha reliability was 0.92 for physical aggression, 0.81 for verbal aggression, 0.86 for anger, and 0.77 for hostility. The three-month test-retest reliability was 0.79 for physical aggression, 0.74 for verbal aggression, 0.80 for anger, and 0.74 for hostility.

Intervention

The mentalization training protocol used in this study was adapted from Karimi et al. (2020) and modified based on Astergard-Hagelquist's (2023) mentalization training manual. The protocol was validated by seven experts, and the Kappa agreement coefficient confirmed its reliability (K = 0.73).

The intervention consisted of eight weekly sessions, including four individual sessions, two family intervention sessions, and two group intervention sessions. The first session introduced session objectives, treatment plan, and pretest administration, followed by discussion on self-harm recognition, intensity assessment, automatic mentalization, and emotional vulnerability. The second session covered reconstruction, mediation, hope, and engagement, with training in curiosity, acceptance, mediation, and stress coping skills. In the third session, participants were taught techniques to address self-harming behaviors, focusing on emotional control strategies and managing uncontrollable emotions. The fourth session involved family and group intervention, identifying family stressors and enhancing intimacy, trust, and empathy. The fifth session focused on managing mentalization failures and countertransference, with exercises in self-awareness, recognizing anxiety and depression symptoms, and therapist-patient interactions. The sixth session aimed at integrating individual, family, and group perspectives, improving communication openness, empathy, and emotional awareness. The seventh session engaged participants in challenging emotional and interpersonal conditions, balancing

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automatic and controlled thoughts, and fostering cognitive-emotional equilibrium. The final session involved planning for mentalization retention, strengthening interpretative abilities, and preparing for long-term behavioral changes. The post-test was conducted, and a follow-up schedule was set.

Data Analysis

Data were analyzed using SPSS version 27. Descriptive statistics included mean and standard deviation, while inferential statistics utilized repeated measures ANOVA and post-hoc tests. The significance level was set at 0.05.

Findings and Results

The participants in this study were 60 male and female students from the first stage of secondary education. In terms of age distribution, the highest frequency percentage belonged to 15-year-old students (83.3%; 23 individuals), while the lowest frequency percentage was observed among 13-year-old students (25%; 15 individuals). Regarding educational grade, the highest frequency percentage was related to eighth-grade students (40%; 24 individuals), followed by ninth-grade students (38.3%; 23 individuals) and seventh-grade students (21.7%; 13 individuals).

Table 1 presents the descriptive statistics of the experimental and control groups concerning emotion regulation and aggression before and after the implementation of the mentalization training program. As shown in Table 1, the mean scores of the experimental and control groups in the dependent variables were nearly identical in the pre-test stage. However, after the implementation of the mentalization training program, the mean score of the experimental group changed in the post-test and follow-up stages. The significance of these changes was examined using repeated measures analysis of variance (ANOVA).

Table 1.

Descriptive Statistics of Research Variables

Variables	Under scale	Gender	Group	Pre-test		Post-test		Follow-up	
				Mean	SD	Mean	SD	Mean	SD
emotion regulation	reappraisal	Boy	Control	24.47	2.95	24.73	2.87	25.27	3.13
			Test	25.27	3.13	30.27	4.91	3.33	3.72
		Girl	Control	27.07	3.99	27.07	5.34	28.40	5.08
			Test	27.26	2.63	32.93	3.95	30.33	5.70
	Suppression	Boy	Control	16.60	1.55	17.60	2.03	17.33	2.97
			Test	16.40	2.06	14.47	3.18	15.93	2.63
		Girl	Control	16.27	3.41	17.53	3.52	16.07	3.97
			Test	16.73	3.01	10.73	1.67	11.87	1.81
aggression	Physical aggression (PA)	Boy	Control	23.07	2.96	22.60	2.61	23.60	3.48
			Test	23.07	2.96	22.60	2.61	23.60	3.48
		Girl	Control	22.73	3.63	22.93	5.16	25.33	4.91
			Test	21.00	3.95	14.27	2.49	14.20	2.08
	verbal aggression (VA)	Boy	Control	16.20	3.30	15.93	2.66	15.13	3.36
			Test	15.80	3.78	11.13	0.99	10.40	1.12
		Girl	Control	15.13	3.60	13.80	3.14	12.80	2.73
			Test	16.27	2.28	9.07	0.88	9.27	0.88
	anger (A)	Boy	Control	21.20	2.83	21.87	4.94	20.00	3.55
			Test	20.40	3.50	17.27	2.40	14.47	1.30
		Girl	Control	19.40	2.67	21.13	2.90	19.20	3.08
			Test	19.20	3.65	15.47	3.18	14.53	2.80
	hostility (H)	Boy	Control	24.07	4.46	23.80	4.46	24.07	3.61
			Test	23.40	4.01	20.13	2.83	16.27	2.55
		Girl	Control	21.47	4.05	21.07	2.60	21.20	2.73
			Test	19.13	4.42	13.73	3.90	12.07	2.43

Before conducting the analysis, the assumptions of ANOVA, including homogeneity of variances, homogeneity of the variance-covariance matrix, and normality of data distribution, were examined. The normality of the data was assessed using the multivariate Shapiro-Wilk test, which indicated that the data distribution was normal (P=0.63; W=0.97). The assumption of homogeneity of the variance-covariance matrix in the multivariate case was tested using Box's M test. The results showed that this assumption was not met (Box'sM=418.02; P=0.01). Therefore, Pillai's trace test was used for drawing conclusions. The homogeneity of variances was examined using Levene's test, and the results indicated that this assumption was satisfied for the dependent variables in the post-test stage (P>0.05). Furthermore, to assess the presence of a correlation structure among the dependent variables and determine the feasibility of performing a multivariate analysis,

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Bartlett's test of sphericity was conducted. The results demonstrated a significant relationship between the dependent variables ($\chi 2=14.99$; P=0.01). Finally, the assumption of sphericity for the variables of emotion regulation and aggression was confirmed (P>0.05). Next, the results of the univariate analysis of covariance (ANCOVA) (Table 2) are presented to examine the effect of gender.

Table 2.

Results of Univariate Analysis of Covariance for Examining Gender Effects

Variables	Source of Variation	df	Mean Square	F	Sig.	Partial η^2
reappraisal	Pre-Test	1	88.71	7.48	0.01	0.14
	Gender	1	25.94	2.19	0.15	0.05
	Group	1	248.19	20.92	0.01	0.32
	Group× Gender	1	6.78	0.57	0.45	0.01
	Error	45	11.86			
Suppression	Pre-Test	1	169.42	67.26	0.01	0.60
	Gender	1	14.27	5.66	0.02	0.11
	Group	1	14.27	5.66	0.02	0.11
	Group× Gender	1	67.55	26.82	0.01	0.37
	Error	45	2.52			
Physical aggression (PA)	Pre-Test	1	0.62	0.20	0.66	0.01
	Gender	1	15.45	1.68	0.20	0.04
	Group	1	506.18	54.94	0.01	0.55
	Group× Gender	1	15.69	1.70	0.20	0.04
	Error	45	9.21			
verbal aggression (VA)	Pre-Test	1	0.31	0.04	0.85	0.01
	Gender	1	27.54	8.94	0.01	0.17
	Group	1	190.36	61.78	0.01	0.58
	Group× Gender	1	0.81	0.26	0.61	0.01
	Error	45	3.08			
anger (A)	Pre-Test	1	12.13	1.73	0.20	0.01
	Gender	1	4.76	0.60	0.44	0.01
	Group	1	199.91	25.09	0.01	0.36
	Group× Gender	1	8.60	1.08	0.30	0.02
	Error	45	7.97			
hostility (H)	Pre-Test	1	102.17	14.54	0.01	0.24
	Gender	1	1.87	0.31	0.58	0.01
	Group	1	119.42	19.72	0.01	0.30
	Group× Gender	1	33.25	55.49	0.02	0.11
	Error	45	6.06			

The results from Table 1 regarding the effect of gender on reappraisal indicated that there was no significant difference between male and female students (P=0.15). However, in the suppression dimension, the findings revealed a statistically significant difference between genders (P=0.02). Additionally, the significant interaction effect between group and gender in the suppression dimension suggests that the interaction between these two variables is meaningful. Regarding aggression, the effect of gender was significant only in the verbal aggression dimension (P=0.01). Furthermore, the significant interaction effect of group and gender in the dimensions of physical aggression and hostility indicates that the interaction between these two variables is meaningful. The results of the repeated measures ANOVA for within-group and between-group differences are presented in Table 3.

Table 3.

Results of ANOVA for Within-Group and Between-Group Differences

Variables	Source of Variation	df	Mean Square	F	Sig.	Partial η^2
reappraisal	time	2	232.93	37.93	0.01	0.58
	Time × Group	2	14.44	2.35	0.10	0.08
	Error	56	6.14			
Suppression	time	2	122.68	45.81	0.01	0.62
	Time × Group	2	45.01	16.81	0.01	0.38
	Error	56	2.68			
Physical aggression (PA)	time	2	3.04.74	53.75	0.01	0.66
	Time × Group	2	15.83	2.79	0.07	0.09
	Error	56	5.67			
verbal aggression (VA)	time	2	368.58	145.82	0.01	0.84
	Time × Group	2	12.31	4.87	0.01	0.15
	Error	56	2.53			
anger (A)	time	2	183.48	71.97	0.01	0.72
	Time × Group	2	1.48	0.58	0.56	0.02
	Error	56	2.55			
hostility (H)	time	2	384.21	101.77	0.01	0.78
	Time × Group	2	11.74	3.11	0.05	0.10
	Error	56	3.78			

Based on Table 3, the results indicated that the effect of time on emotion regulation scores (reappraisal and suppression) and aggression (physical aggression, verbal aggression, anger, and hostility) across the pre-test, post-test, and follow-up stages was significant (P<0.05). The interaction effect of time and group also demonstrated that the difference between the experimental and control groups in terms of the mean scores of emotion regulation and aggression remained significant throughout all study phases (P<0.05). This finding suggests the effectiveness of the mentalization training program in improving emotion regulation and reducing aggression in the post-test and follow-up stages compared to the control group. Table 4 presents the results of the Bonferroni post-hoc test for pairwise comparisons of group means across the three time points.

Table 4.

Results of Bonferroni Post-Hoc Test for Pairwise Comparison of Group Means Across Three Time Points

Variables	time	Mean Difference	Standard error	Sig.
reappraisal	Pre-Test - Follow-Up	-4.06	0.72	0.01
	Post-Test - Follow-Up	1.26	0.56	0.10
Suppression	Pre-Test - Follow-Up	2.66	0.38	0.01
	Post-Test - Follow-Up	-1.30	0.46	0.10
Physical aggression (PA)	Pre-Test - Follow-Up	5.60	0.68	0.01
	Post-Test - Follow-Up	0.23	0.41	1.00
verbal aggression (VA)	Pre-Test - Follow-Up	6.20	0.49	0.01
	Post-Test - Follow-Up	0.27	0.15	0.27
anger (A)	Pre-Test - Follow-Up	4.80	0.44	0.01
	Post-Test - Follow-Up	1.36	0.35	0.09
hostility (H)	Pre-Test - Follow-Up	7.10	0.54	0.01
	Post-Test - Follow-Up	2.76	0.44	0.04

According to Table 4, there was a significant difference in emotion regulation (reappraisal and suppression strategies) and aggression (physical aggression, verbal aggression, anger, and hostility)

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between the pre-test and follow-up stages (P<0.05). However, no significant difference was found between the post-test and follow-up stages (P>0.05), indicating the stability of the intervention effects over time. A comparison of mean scores revealed that reappraisal significantly increased in the follow-up stage compared to the pre-test stage. Regarding suppression, physical aggression, verbal aggression, anger, and hostility, a significant reduction was observed in the follow-up stage compared to the pre-test stage.

Discussion and Conclusion

The present study aimed to examine the effectiveness of mentalization training on emotion regulation and aggression in adolescent boys and girls. The results indicated that mentalization training was effective in improving emotion regulation in the dimensions of suppression and reappraisal. This effect persisted in the three-month follow-up period. Regarding gender effects, the findings showed no significant difference between boys and girls in reappraisal. However, a significant statistical difference was observed in the suppression dimension between the two groups.

Although no prior study was found that specifically examined the effectiveness of mentalization training on emotion regulation strategies, the findings of this study align with previous research by Basharpour and Eini (2019), Midgley et al. (2023), and Mohajerin and Howard (2024), which demonstrated the positive effects of mentalization-based treatment on emotional disorders and improvements in emotion regulation capacity.

Mentalization training is rooted in psychoanalytic theories, attachment theory, and social cognition, emphasizing mentalization as a crucial factor for psychological well-being and functioning (Fonagy et al., 2018). The capacity for mentalization develops within social interactions, and its quality is influenced by the mental states of those around an individual. Therefore, children raised in secure family environments are more likely to develop secure attachment styles, leading to enhanced mentalization processes. Conversely, children growing up in insecure family environments or experiencing severe trauma may struggle to feel secure about others' perceptions of them. This can result in poor mentalization capacity, deficiencies in empathy, and difficulties distinguishing their own mental states from those of others (Richel & Kays, 2021).

Recent empirical evidence supports the hypothesis that attachment styles play a crucial role in emotion regulation processes in psychiatric disorders among adolescents (Rubin et al., 2023). Attachment orientations have significant implications for emotion regulation and overall well-being, with insecure attachment being linked to deficits in neural structures associated with emotion regulation (Mikulincer & Shaver, 2019). A related study found that adolescents who experienced childhood trauma had more difficulty regulating their emotions (Sharma et al., 2024). The mentalization training framework suggests that such experiences deactivate the attachment system and disrupt individuals' mentalization capacity. Therefore, through empathic validation and the creation of a shared emotional platform between the therapist and the patient, mentalization training sessions help patients feel less isolated (Ghafari Cherati et al., 2023).

In other words, emphasizing affective and interpersonal interaction throughout therapy provides an environment in which more complex mental states can be explored, particularly in attachment-related contexts that typically impair mentalization. This process may reduce reliance on suppression strategies while increasing the use of reappraisal strategies among adolescent boys and girls. Furthermore, developing an integrated self-image facilitated by mentalization enhances adaptive processing of stress-related arousal and the regulation of distressing emotions (Midgley et al., 2023). Within the mentalization framework, Fonagy et al. (2018) stated that maintaining a mental representation of potentially stressful events requires a set of metacognitive processes that connect an individual to their social environment, mitigating the impact of adversity. Thus, mentalization may serve as a foundation for several key psychological abilities essential for mental health, such as emotion regulation strategies, agency, self-efficacy, and psychological well-being (Mohajerin & Howard, 2024).

Another finding of this study demonstrated that mentalization training effectively reduced aggression (physical aggression, verbal aggression, anger, and hostility) in adolescent boys and girls. This effect persisted in the three-month follow-up period. Additionally, it was found that the effect of gender was significant only in the verbal aggression dimension. Although no study was found that specifically examined

the effects of mentalization training on different dimensions of aggression, this study's findings are consistent with prior research on the effectiveness of mentalization training in reducing aggressive behaviors. In this regard, a study by Taubner et al. (2021) on adolescents with conduct disorder found that fostering mentalization in social interactions was associated with reduced aggressive behaviors. Another study revealed that mentalization-based intervention effectively reduced irritability and aggression among university students (Ahmadi et al., 2023).

It is hypothesized that attachment disorders and deficits in mentalization underlie aggressive behavior, as demonstrated in individuals with behavioral issues (Garofabo et al., 2018; Bonua et al., 2022). Deficiencies in mentalization have been described as an increased perception of threat in social signals, reduced sensitivity to others' distress (Fonagy et al., 2018), the activation of aggression as a survival mechanism, or an impaired ability to inhibit aggressive behavior. In mentalization-based treatment for adolescents, therapists adopt a stance of "not-knowing" regarding the underlying psychological states behind aggressive behavior to prevent reinforcement in the face of aggression (Fonagy et al., 2018).

Accordingly, in mentalization training sessions, therapists focus on the psychological perception of adolescents' aggression, helping them mentally process emotions that trigger aggressive behavior to regulate their arousal. For example, in training sessions, therapists assess students' ability to maintain and regain mentalization when faced with emotionally charged interpersonal events such as misunderstandings, disagreements, rejection, and intimacy. Throughout the intervention, developmental and attachment-related experiences are discussed to evaluate how individuals can mentalize close relationships and when this ability is impaired (Taubner et al., 2021). When weakened mentalization is observed, therapists intervene with "counter-movements," encouraging students to discover their missing perspective (Bateman & Fonagy, 2010). This process helps students develop a balanced perspective, reducing overly rigid, reactive, unrealistic, and emotionally devoid viewpoints, allowing them to learn more appropriate interpersonal behaviors. As a result, recognizing the importance of relationships helps reduce aggressive behaviors.

One limitation of the present study was the use of self-report measures, which may be subject to bias and response distortions. Additionally, the sample was limited to male and female students in the first stage of secondary education from public and private schools in Arak, which may restrict the generalizability of the results to other populations or broader contexts. Expanding the sample to include diverse populations across different age groups and cultural backgrounds would enhance the generalizability of the findings. Moreover, incorporating objective measures, such as interviews or behavioral observations, alongside self-report tools could help minimize data-related biases.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

By the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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