

Research Paper

Emotion Regulation Training on Irritability, Alexithymia, and Interpersonal Problems of Adolescents With Disruptive Mood Dysregulation Disorder

Masoumeh Falah Neudehi¹, Farnaz Rezaei^{2*}, Ameneh Bozorgi Kazerooni³, Zahra Ebadi⁴

1. Department of Educational Sciences and Psychology, Payame Noor University, Tehran, Iran.

2. Department of Clinical Psychology, Faculty of Literature Humanities and Social Sciences, Science and Research Branch, Islamic Azad University, Tehran, Iran.

3. Department of General Psychology, Faculty of Psychology and Educational Sciences, Marvdasht Branch, Islamic Azad University, Marvdasht, Iran.

4. Department of Psychology, Payame Noor University, Tehran, Iran.



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**ABSTRACT**

Background: Difficulty regulating emotion has been identified as a trans-diagnostic factor common to various psychiatric diagnoses and behavior problems. This study aims to implement emotion regulation training techniques on adolescents with a disruptive mood disorder, emphasizing the irritability, alexithymia, and interpersonal issues in adolescents with disruptive mood dysregulation disorder.

Methods: This quasi-experimental research used a pre-test and post-test design on 30 disruptive mood disorders in Tehran City, Iran, from 2022 to 2023. The participants were selected via simple purposive sampling. They were randomly assigned to two 15-member groups (experimental and control). The intervention group received self-regulation training over two months through eight 90-min group therapy sessions, whereas the control group received no treatment. The data were collected using the Barratt impulsiveness scale (BIS-11), Toronto alexithymia scale (TAS-20), and the inventory of interpersonal problems short-version. The data were analyzed by the SPSS software, version 25, and the multivariate analysis of covariance.

Results: As indicated by the results, a significant difference was detected between the groups in terms of irritability ($F=26.45$, $P=0.001$, $\eta=0.695$), alexithymia ($F=38.91$, $P=0.001$, $\eta=0.781$), and interpersonal problems ($F=31.27$, $P=0.001$, $\eta=0.734$). Moreover, according to the alexithymia's largest effect size (0.781), emotion regulation training had more effect on alexithymia.

Conclusion: Based on the results, emotion regulation training can be implemented effectively in clinics and psychological treatment centers. Also, because of using emotion regulation training, it is possible to improve these people's psychological characteristics and social relations. It is also suggested that relevant organizations train specialists and school counselors accordingly.

Keywords: Emotion regulation, Irritability, Alexithymia, Interpersonal problems, Adolescents, Mood disorder

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*** Corresponding Author:**

Farnaz Rezaei

Address: Department of Clinical Psychology, Faculty of Literature Humanities and Social Sciences, Science and Research Branch, Islamic Azad University, Tehran, Iran.

Phone: +98 (912) 4963054

E-mail: farnazrezaei.91@yahoo.com

1. Introduction

Chronic, severe irritability is a common problem in children and adolescents [1]. Reflecting this pressing public health need, such a diagnostic and statistical manual of mental disorders, 5th edition (DSM-5) as disruptive mood dysregulation disorder (DMDD) [1, 2]. The prevalence estimates for severe irritability in school-age children and adolescents range from 0.12% to 5%, with 3% being the most common estimate for DMDD [1]. Irritable people are likely to suffer from poor functional outcomes throughout their lives, including concurrent and longitudinal emotional disorders, suicidality, poor school performance, and difficulties in their social and professional lives. Children with high irritability also have distinct physiological profiles, including hyper-reactivity to stress and perception of threats. The central diagnostic feature of DMDD is chronic and severe irritability, leading to functional impairment. DMDD has been operationalized for research as severe irritability related to hyper-arousal symptoms (agitation and distractibility) [3]. As relevant to emotion regulation, the pathophysiology of severe irritability has been associated with reduced context-dependent regulation, dysregulated attention-emotion interactions, and the misinterpretation of social cues, such as a preferential threat bias [4]. It is common for adolescents to develop behavioral problems because of emotional dysregulation during adolescence. Dysregulation of emotion refers to the inability to control one's affective expression in different circumstances. As a result, it has little flexibility and spontaneity, a lack of control, and demonstration of disruptive behaviors [5]. Alexithymia and low emotion differentiation restrict access to emotional information and increase the propensity toward dysregulated and deviant behaviors, such as impulsive aggression [6].

In the study by Edwards & Wupperman (2017), alexithymic features and emotion differentiation explained nearly 43% of the variance in impulsive aggression. These relationships were fully mediated by emotion-regulation difficulty [6]. Moreover, the difficulty identifying feelings subscale of the Toronto alexithymia scale (TAS-20) was positively associated with alcohol problems through emotional dysregulation and psychological distress [7]. Inflexible emotion regulation increases allostatic load from frequent stress, inadequate reactivity, failed shutdown, and habituation. They may result in physical and mental illness. Alexithymia exemplifies inflexible emotion regulation with dysfunctions potentially across all stages of emotion processing, both psychologically and physiologically [8]. The findings

suggested that the interpersonal style of alexithymic individuals is characterized by cold and socially avoidant behavior, corresponding to the predominantly insecure attachment pattern found in alexithymia [9].

A previous study showed that the TAS-20 scores correlate with numerous psychiatric concerns, mainly in the internalizing spectrum, thought difficulties, and self-reported aggression [10]. Furthermore, results revealed institutionalized girls to be more alexithymic, showing more difficulty identifying and describing feelings than boys, similar to community groups. Higher alexithymia was related to more total, internalizing, and externalizing problems through similar mechanisms of risk in community groups [11]. Concerning mood regulation, Besharat and Shahidi showed adolescent addicts with statistically significant differences compared to the control group. They showed lower attention to their feelings and lower repair of mood. Patients had low clarity of feelings and low mood repair significantly related to the first substance abuse (cannabinoids), and a significant relation between low attention to feelings and the cause of drug abuse was peer pressure and novelty-seeking [12]. Interpersonal difficulties are experienced with others and cause mental distress or are associated with mental disturbances. They include difficulties in assertiveness, sociability, submissiveness, intimacy, responsibility, and control. People with alexithymia cannot correctly identify emotions from other individuals' faces. They cannot always show sympathy toward other individuals [13]. Analysis shows a direct relationship between alexithymia and social, familial, and romantic loneliness. Moreover, interpersonal distrust partly mediates this relationship, and alexithymia and interpersonal distrust interact to predict social and family loneliness. These findings suggest that links between the facets of alexithymia, interpersonal distrust, and loneliness are complex and multifaceted and discussed concerning interventions for young adolescents [14].

Considering therapeutic techniques currently available to clinicians may help target pathophysiological processes in severe mood dysregulation, and DMDD is useful. Comprehensive treatments for these patients will likely integrate well-conceptualized tools from extant interventions with novel advances tailored to the mechanisms of chronic irritability. Currently, DMDD is a severe and impairing psychiatric disorder without any validated psychotherapeutic or psycho-pharmacological interventions [4]. Currently, no gold standard, evidence-based treatments exist exclusively for DMDD or severe mood dysregulation; however, interventions designed for related clinical disorders have demonstrated prom-

ising findings, including parent management training, cognitive-behavioral therapy, and psychopharmacological interventions [4]. Non-pharmacological therapies throughout the treatment course included cognitive behavioral therapy, dialectical behavior therapy, 12-step facilitation, contingency management, family systems therapy, motivational enhancement therapy, psychodynamic psychotherapy, and motivational interviewing [15]. Since DMDD has recently been added as an efficacious treatment that specifically targets severe irritability, its presence in DMDD is still being developed [16]. The therapeutic emotion regulation process for children diagnosed with DMDD is a primary target, aiming to promote the child's emotional development [17]. From a clinical perspective, emotion regulation is of utmost importance in interventions for childhood emotional and behavioral disorders, which are often aimed at promoting child self-regulation, approved in numerous studies [4, 17-21]. This study aims to implement self-regulation training techniques for adolescents with a disruptive mood disorder, emphasizing irritability, alexithymia, and interpersonal problems in adolescents with DMDD.

2. Methods

To evaluate the effectiveness of group training, we used the quasi-experimental method with a pre-test/post-test design and a control group. The study population comprised all 13 to 16 year-old girls in Tehran City, Iran, from 2022 to 2023 who had DMDD. A total of 30

girls were selected based on the multi-stage cluster random sampling method. The adequacy of the sample size was confirmed by the G*Power software, version 3.1.9.7 ($\alpha=0.05$ and test power=0.80). Four junior high schools were randomly selected from the education districts of Tehran. Next, 6 classes from each school (seventh, eighth, and ninth grade) were chosen. Based on the questionnaire, 30 adolescents with a history of DMDD were selected as the sample and randomly assigned to two groups of experimental (n=15) and control (n=15). Thus, the inclusion criteria were female adolescents aged 13 to 16 years and at least one experience of DMDD. Before group training, members of both groups were assessed during the pre-test. Emotion regulation group training was applied to the experimental group, while the control group did not receive any training (Figure 1). Then, the participants in both groups were evaluated in the post-test to measure the effect of the independent variable (training) on the dependent variables (irritability, alexithymia, and interpersonal problems). This method is usually done when it is impossible to control all relevant variables in the research; therefore, relative control is possible by accurately identifying the factors that affect the external and internal validity. To apply maximum control, the groups were selected from a homogeneous community, and the subjects were randomly assigned to the experimental and control groups. The inclusion criteria were being female, having DMDD, and having 13 to 16 years of age. The exclusion criteria were having any psychological disorder, simultaneous participa-

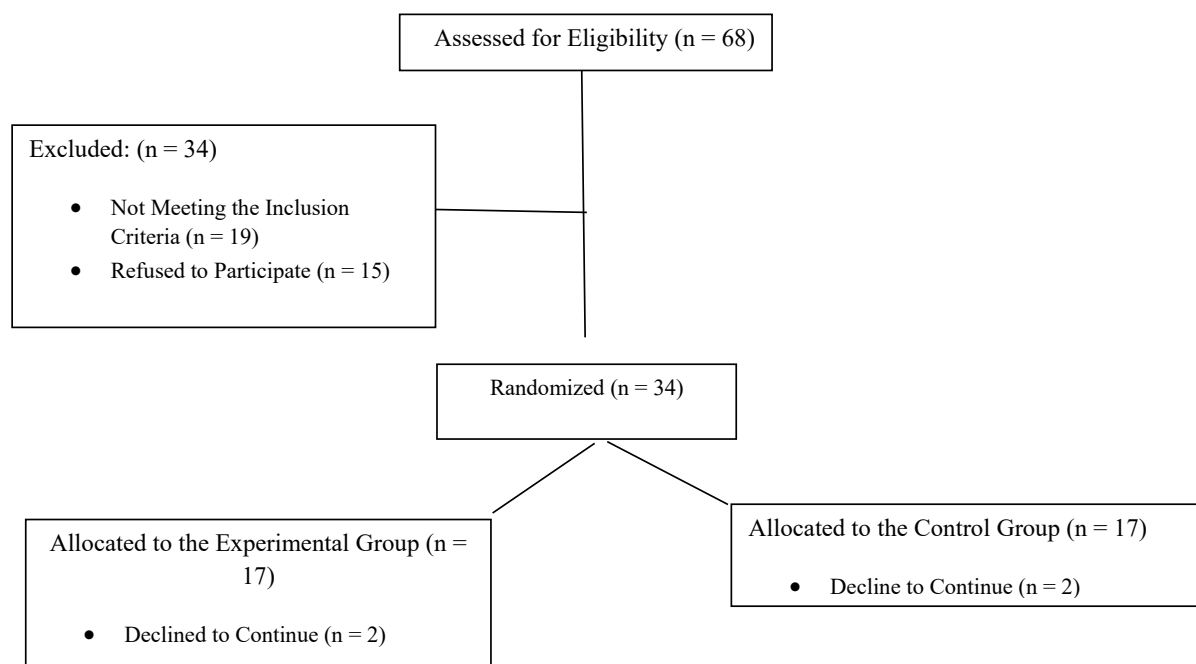


Figure 1. CONSORT



tion in other training and counseling courses, and having more than 3 absent sessions during the training. Then, the pre-tests were received from all three groups, and the intervention group received self-regulation training over 2 months through eight 90-min based on the Gross protocol [22]. The summary of the sessions is reported in Table 1. The control group received no treatment. A clinical psychologist performed eight sessions of intervention in a group twice weekly in one of the counseling and psychological service centers and clinics of the fifth district in Tehran City, Iran. The researcher reaffirms the participants' understanding of their right to withdraw from the study for any reason. In addition, signed informed consent forms were obtained from the participants. Research objectives, procedures, benefits, voluntary participation, and confidentiality were explained to the participants. A post-test was received from all three groups, and the data were analyzed using the SPSS software, version 25, along with the multivariate analysis of covariance (MANCOVA). This research tested the linearity of the relationship between each dependent variable and its covariate. The linear significance level of the relationship between pre-test and post-test irritability, alexithymia, and interpersonal problems was obtained at $r=0.82$, $r=0.80$, and $r=0.80$, respectively ($P<0.05$). According to the received data, the assumption of linearity

was established. The results of the homogeneity variance assumption according to the Levene test were insignificant in the variable of irritability ($F_{(1, 28)}=0.81$, $P=0.24$), alexithymia ($F_{(1, 28)}=0.81$, $P=0.24$), and interpersonal problems ($F_{(1, 28)}=0.26$, $P=0.65$), respectively. Accordingly, the assumption of homogeneity of variances was confirmed ($P>0.05$). In addition, the significance level of the Kolmogorov-Smirnov test was more significant than 0.05; therefore, the assumption of normal distribution of the variables was established.

The Barratt impulsiveness scale (BIS-11)

BIS-11 has 30 items in self-report format on a 5-point scale (never, rarely, sometimes, often, and always). These items are scored to result in 6 first-order factors (attention, motor, self-control, cognitive complexity, perseverance, and cognitive instability impulsiveness) and three second-order factors (attentional, motor, and non-planning impulsiveness). Then, 11 out of 30 items on this scale are reversed (the highest and the lowest). The score of the non-psychiatric control group is usually between 50 and 60 [21]. This scale measures three factors of impulsivity: 2 cognitive/attentional impulsivities (quick cognitive decisions), 3 motor impulsivity (acting without thinking), and 4 impulsivities (a

Table 1. An overview of the interventions

Meetings	Descriptions
1 st	The 1 st session includes the pre-test implementation, communication, conceptualization, and the need for emotion regulation training.
2 nd	The 2 nd session includes teaching awareness of positive emotions, a brief overview of the previous session, teaching awareness of positive emotions and their types (happiness, interest, and love), introducing attention to positive emotions, and the need to use them along with examples in the form of mental visualization (for example visualizing a happy scene [homework, writing major positive emotions, and recording them in the relevant form]).
3 rd	The 3 rd session includes teaching awareness of negative emotions, a brief overview of the previous session, teaching awareness of negative emotions and their types (anxiety, sadness, anger, and hatred), and teaching attention to negative emotions and the need to use them along with an example in the form of mental visualization (for example, visualizing an anxiety-provoking scene [homework, writing major negative emotions and recording them in the relevant form]).
4 th	The 4 th session includes learning to accept positive emotions, a review of the previous session, learning to accept without judgment the amount and number (high and low) of positive emotions and the positive and negative consequences of using these emotions, homework to ask their spouse or close friend for their opinion on whether positive emotions are low or high and registration in the relevant form.
5 th	The lesson of the 4 th session about negative emotions, along with the homework of the same session about negative emotions, are included in the 5 th session.
6 th	The 6 th session includes training to re-evaluate and express positive emotions, reviewing the previous session, training the mental experience of positive emotions in the form of mental visualization (happiness, interest, and love), mental inhibition, and training to express these emotions appropriately.
7 th	The 7 th session includes training to re-evaluate and express negative emotions, reviewing the previous session, training the mental experience of negative emotions in the form of mental visualization (anxiety, sadness, anger, and hatred), inappropriate expression, and prevention of inappropriate expression of these emotions.
8 th	A summary of meetings and implementation of the post-exam are included in the 8 th session.



lack of foresight or sudden direction finding). In Iran, the validity and reliability of the mentioned research were 0.75 and 83.0, respectively, which shows that the validity and reliability of the Persian translation are desirable [22]. The Cronbach α in this study was 0.58.

Toronto alexithymia scale (TAS-20)

TAS-20 was developed in 1985 by Bagby et al. [23]. This scale is a self-report measure of deficiency in understanding, processing, or describing emotions. The current version comprises 20 items rated on a 5-point Likert scale (1=strongly disagree and 5=strongly agree). TAS-20 measures the following three factors: Factor I, difficulty in identifying feelings (1, 3, 6, 7, 9, 13, 14); factor II, difficulty in describing feelings (2, 4, 11, 12, 17); factor III, externally-oriented thinking (5, 8, 10, 15, 16, 18, 19, 20). Five items are scored inversely (4, 5, 10, 18, and 19). The total score can range from 0 to 100 (higher scores indicate more significant impairment/challenges). The total alexithymia score is the sum of responses to all 20 items, while the score for each subscale factor is the sum of the responses to that subscale. The TAS-20 uses the following cut-offs: Scores equal to or <51 indicate non-alexithymia, scores of 52 to 60 indicate possible alexithymia, and scores >61 suggest alexithymia. Iranian studies supported the three-factor structure, internal consistency, test re-test reliability, and predictive validity of the Persian TAS-20 in both clinical and non-clinical samples [24]. In this study, the Cronbach α was 0.78.

The inventory of interpersonal problems-short version (IIP-32)

IIP-32 was developed by Barkham et al. and is scored according to a 5-point Likert scale, ranging from 0 (not at all) to 5 (strongly) [25]. This scale is a self-report inventory, and its questions concern the problems people usually experience in interpersonal relations. High scores

on IIP-32 are indicators of poorer interpersonal functioning [25]. The 8 factors are assertiveness and sociability, openness, caring, aggression, supportiveness and involvement, and dependency. The IIP-32 subscales' internal consistency was calculated using the Cronbach α coefficient, ranging from 0.60 to 0.83. For the total consistency, a score of 0.81 and 0.86 was obtained [23]. The reliability of the Persian version of IIP-32 was calculated using internal consistency and half-split coefficients, namely 0.82 and 0.83, respectively [26]. According to the current research, the Cronbach α was 0.73.

3. Results

The analysis of adolescents showed that the mean age in the two groups was 15.11+2.33 years. Also, the chi-square test results showed no significant differences between groups regarding age and education grade ($P>0.05$) (Table 2).

Table 3 shows that the Mean+SD of irritability, alexithymia, and interpersonal problems modified significantly compared to their post-test scores.

After evaluating the MANCOVA data, the test results showed a significant difference between variables in experimental and control groups ($\lambda=0.432$, $F=68.34$, $P<0.01$). According to MANCOVA, two covariance analyses were conducted to determine this difference. In the experimental and control groups, 61% of the variances were explained by the independent variable based on the calculated effect size.

As indicated by the univariate results in Table 4, there is a significant difference between the groups in terms of irritability ($F=26.45$, $P=0.001$, $\eta=0.695$), alexithymia ($F=38.91$, $P=0.001$, $\eta=0.781$), and interpersonal problems ($F=31.27$, $P=0.001$, $\eta=0.734$). Moreover, according to the alexithymia's largest effect size ($\eta=0.781$), emotion regulation training had more effect on alexithymia.

Table 2. Demographic characteristics according to the two experimental groups and the control group

Demographic Variables	Demographic Information	Experimental	Control	χ^2	Sig.
Age (y)	13-14	9	8	0.34	0.78
	15-16	6	7		
Grade	7 th	5	6	1.21	0.66
	8 th	4	4		
	9 th	6	5		



Table 3. Results of the multivariate analysis

Variables	Group	Mean±SD		p [‡]
		Pre-test	Post-test	
Irritability	Experimental	114.36±13.45	141.32±15.21	0.001
	Control	113.06±12.79	115.63±14.19	0.66
	p [‡]	0.74	0.001	
Alexithymia	Experimental	54.68±6.41	71.73±6.94	0.001
	Control	55.24±6.64	56.28±5.35	0.43
	p [‡]	0.56	0.006	
Interpersonal problems	Experimental	89.74±8.47	111.21±10.17	0.001
	Control	88.20±7.62	90.83±8.57	0.33
	p [‡]	0.36	0.003	

[‡]Student t-test, [‡]Paired t-test.

**Table 4.** Results of analysis of covariance in the multivariate analysis of covariance

Dependent Variables	SS	df	MS	F	P	Eta
Irritability	3820.17	1	3820.17	26.45	0.001	0.695
Alexithymia	7819.43	1	7819.43	38.91	0.001	0.781
Interpersonal problems	5437.78	1	5437.78	31.27	0.001	0.734



4. Discussion

This article emphasizes self-regulation training techniques for adolescents with DMDD irritability, alexithymia, and interpersonal problems. The intervention significantly alleviated irritability, alexithymia, and interpersonal problems among adolescent girls with a disruptive mood disorder. This result is consistent with the previous studies on the effectiveness of group emotional regulation therapy [5, 17-20].

Vafaei et al. showed that emotion-regulation group training reduced self-injury behavior and the rate of depression and anger in adolescents [19]. As a result, Sheybani et al. demonstrated that cognitive-behavioral therapy and emotion regulation did not significantly differ in reducing anxiety, stress, and excitability in people with DMDD; however, both affected positive and negative emotions equally. There was a more significant reduction in depression symptoms with emotional regulation [20]. A study of adolescent girls with DMDD showed

that this intervention could effectively improve emotional processing. Regulating emotions requires emotional awareness, acceptance, and control of impulsive behavior. The authors found the tendency to act impulsively in people who lack an understanding of their feelings and cannot control their violent tendencies with conscious effort. As a result, poor communication often occurs. This study showed that adolescent girls with DMDD are more attentive to their feelings and how to identify emotions in others [27, 28].

Hsu et al. results indicated a significant trend toward reducing impulsivity, anger with resentment, physical aggression, suspicion, and hostility. The intervention significantly alleviated the intensity of cognitive failure, improved the management of alexithymia features and attribution styles and errors, and fostered adequate decision-making styles and emotion regulation capacity [18]. This intervention provided patients with a more active role in managing their violent behavior with the involvement of alexithymia. Improvements in specific

social cognitive functions, such as alexithymia features, attributional style, decision-making style, and preferences, can also be related to reductions in violent actions [18]. Similarly, alexithymia is associated with aggressive behavior because of emotional avoidance and emotional inexpressiveness [10-12], which is negatively correlated with the ability to cope with stress [8]. Although alexithymia is not a personality disorder, alexithymia may be associated with personality dysfunction [9].

The skills taught to the subjects during the program (especially emotion regulation skills) can reduce self-injury behavior in individuals. Accordingly, at the end of the sessions, individuals become more successful in regulating emotions by acquiring emotional regulation skills, including emotion recognition, perception, vulnerability, and suffering. Consequently, their dysfunctional behaviors are reduced. Emotional-regulation training by informing people about positive emotions, their acceptance, and timely expression is essential in reducing physical and mental symptoms and improving social functioning and levels of mental health. Thus, emotion regulation involves numerous regulatory processes and strategies, including cognitive, physical, social, and behavioral dimensions. Emotion-regulation strategies are used to increase adjustment and adaptation to manage emotions and are part of adaptation strategies related to the experience and treatment of emotional and physical disorders. Therefore, emotional regulation reduces negative emotions, such as depression, and increases positive emotions and adaptive behavior [19]. Irritable people perceive even the smallest provocation as a mistake and are more likely to become angry. As a result, maladaptive patients with destructive moods can avoid blaming themselves, blaming others, and having mental negativity through emotional regulation. Furthermore, emotional regulation significantly affects emotionally vulnerable people to allow themselves to be in their current time and place. As a result, they are more objective about the extent to which the situation is getting threatened instead of reacting with anger and confusion [20].

In generalizing the findings of this study to people in other cities and regions, caution should be observed due to some limitations of this study. For instance, the sample size of people for each group was small. Since the control group did not receive any intervention, the placebo effect of training is not apparent. The design does not have a follow-up stage, and considering the educational intervention, the impact continuity is unclear, which is one limitation of this study. To better understand how effective emotion regulation training is according to the Iranian cultural context, future research should be conducted by comparing it with other new therapeutic approaches, includ-

ing third-wave therapies. Doing a test after the treatment period is suggested to see if it worked for a long time and to ensure everything is stable. One of the most important questions that may be applicable and useful in the way of science is doing the same variables on the parents of these children and using the same approach and variables in adolescents with self-harm and comparing it with children with DMDD. It is also suggested that the lack of purposefulness and executive functions such as metacognition and cognitive flexibility in these people should be investigated in future studies and compared with a healthy group.

5. Conclusion

Based on the present research results, emotion regulation training effectively reduces irritability, alexithymia, and DMDD in children and adolescents. It also causes a significant increase in interpersonal problems; therefore, this is considered an effective and practical method. It can be implemented effectively in clinics and psychological treatment centers. Also, as a result of using emotion regulation training, it is possible to improve these people's psychological characteristics and social relations. It is also suggested that relevant organizations train specialists and school counselors this way.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by [Tehran Medical Sciences, Islamic Azad University](#) (Code: IR.AUMS.REC.1400.210).

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Authors' contributions

Conceptualization and supervision: Masoumeh Falah Neudehi and Farnaz Rezaei; Methodology: Ameneh Bozorgi Kazerooni and Zahra Ebadi; Data collection: Farnaz Rezaei; Investigation, data analysis, writing original draft, review and editing: All authors.

Conflict of interest

The authors declared no conflict of interest.

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