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Impact of Reality Therapy on Alexithymia and Social Cognition in Adolescents with Blood Coagulation Disorders: A Two-Phase Follow-up Study

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Abstract

Introduction: Alexithymia is a personality trait involving difficulty in identifying and expressing emotions, which can impair emotional regulation. Adolescents with blood coagulation disorders may experience alexithymia due to the psychological burden of their chronic medical condition, impacting their emotional well-being and social functioning. This study aimed to evaluate the effectiveness of reality therapy on alexithymia and social cognition among adolescents diagnosed with blood coagulation disorders.

Method: Conducted in two phases, the research first developed and validated an educational package based on reality therapy principles. In the second phase, a semi-experimental design with pre-test, post-test, and a three-month follow-up was implemented. A total of 32 adolescents aged 13–18 with hemostatic disorders, registered at the Iranian Hemophilia Society in Tehran, were selected through convenience sampling and randomly assigned to experimental and control groups. The intervention comprised eight weekly 90-minute group sessions based on reality therapy principles, including the WDEP system, with active parent involvement to support adolescents' emotional and behavioral development. The data collection tools included the Toronto Alexithymia Scale (TAS-20) and the Student Social Cognition Questionnaire (SHAD). Data were analyzed using SPSS version 25, employing descriptive statistics and repeated measures ANOVA for pre-test, post-test, and follow-up comparisons.

Results: The intervention group showed significant reductions in total alexithymia scores and its subscales: difficulty identifying feelings, difficulty describing feelings, and externally-oriented thinking ($F = 27.45$, $p < 0.001$, $\eta^2 = 0.48$). Additionally, improvements were observed in social cognition, including self-awareness and recognition of educational threats, sustained through the three-month follow-up period.

Conclusion: Enhancements were also observed in social cognition, including self-awareness and recognition of educational threats. These improvements remained stable at the three-month follow-up, suggesting that reality therapy has a lasting positive effect on emotional processing and social understanding in this population.

Keywords: Adolescent, Blood Coagulation Disorders, Reality Therapy, Alexithymia, Social Cognition

Introduction

Adolescence is a challenging period marked by significant emotional and social growth. For adolescents living with chronic medical conditions such as Bleeding Coagulation Disorders (BCDs), the health management challenges they face, combined with the typical developmental tasks of adolescence, can be particularly daunting [1].

BCDs are a group of chronic medical conditions marked by dysfunctional blood clotting,

which can lead to either excessive bleeding or thrombosis. For adolescents, managing a BCD is a profound daily struggle. The condition is often unpredictable and painful, frequently causing debilitating joint damage and disability that significantly compromise their quality of life. The absence of a definitive cure for many BCDs, such as hemophilia, forces young patients into a relentless cycle of frequent and burdensome medical visits, placing considerable psychological pressure on them and their families. Emerging research underscores that an adolescent's comprehension of their illness is pivotal, as it directly influences their adherence to complex treatment plans and their ability to develop crucial adaptive coping strategies [1-3].

In many of these patients, the adolescent growth and development stage is particularly challenging. During this period, individuals may become dependent on others due to the specific requirements of their illness and care, causing distress and potentially leading to psychological issues that can impact their work, school, and social activities [4]. Adolescence is a time of significant change and challenge. During this period, a rapid increase in social and emotional information can heighten an individual’s sensitivity to their own emotions and those of others. To establish their identity within their family and society, adolescents may engage in destructive or risky behaviors, or they might suppress their emotions. Ultimately, these coping strategies can contribute to the development of alexithymia [5]. Among the numerous challenges these adolescents face, alexithymia and social cognitive impairments stand out as prominent issues that can significantly affect their overall well-being [2].

Alexithymia refers to difficulties in emotional self-regulation and impairment in the cognitive processing of emotional information [6]. Alexithymia comprises two cognitive and emotional dimensions, encompassing challenges in the identification, comprehension, and interpretation of emotional information. Additionally, it involves difficulties in responding to and expressing feelings [7]. Alexithymia, often described as "emotional blindness," is a personality trait characterized by significant difficulty in identifying, understanding, and expressing one's own emotions. Individuals with alexithymia struggle to differentiate between feelings and the body's physical sensations, have a limited ability to describe their emotions to others, and often exhibit a concrete, externally-focused thinking style with little imaginative capacity. These challenges can severely impair their ability to regulate emotions, particularly in social situations [8]. Individuals with alexithymia often amplify abnormal bodily sensations, misinterpret physical signs of emotional arousal, and express emotional distress through physical complaints [9]. According to conducted studies, alexithymia can be used alongside the concept of social cognition, which encompasses both emotional and social factors, as it influences individuals' social understanding. This is particularly relevant in the context of individuals with blood coagulation disorders, as social cognition affects them alongside emotional factors [10].

The social aspect of adolescence, characterized by the formation of peer relationships, emotional regulation in social contexts, and the development of social cognition, can be particularly challenging for adolescents with BCD. These individuals may face unique social stressors related to their condition, such as managing medical appointments, explaining their situation to peers, and coping with the emotional impact of potential physical limitations [1].

Social cognition is defined as an individual's capacity to understand oneself and others based on physical and mental states, along with the ability to manage social affairs for establishing relationships with peers and regulating one's emotions and feelings in interpersonal relationships [11]. The ability to think and engage socially contributes to the development of social cognition, encompassing all the necessary skills for understanding the desires, emotions, and feelings of others [12]. Social cognition is described as the study of mental processes, involving understanding, paying attention, remembering, thinking about something, and ultimately feeling individuals in the social world [11].

Adolescents with BCD face multifaceted challenges that impact both their emotional well-being and social cognition [13]. Given this complexity, therapeutic interventions that comprehensively address these interconnected issues are essential. Reality therapy, which emphasizes personal responsibility, self-evaluation, and informed decision-making, offers a promising approach. This therapy helps individuals align their choices with their core values and needs, which can empower adolescents with BCD to manage emotional responses and navigate social complexities more effectively. Indeed, previous studies have highlighted the effectiveness of reality therapy in improving emotional regulation and psychological well-being in adolescent populations [14]. Reality therapy, developed by William Glasser, is rooted in choice theory, which posits that human behavior is driven by the need to fulfill five basic needs: survival, love and belonging, power, freedom, and fun. This therapeutic approach focuses on helping individuals take responsibility for their actions, assess the effectiveness of their behaviors, and make choices that align with their goals and values. Reality therapy is distinct in its emphasis on the present and future, encouraging individuals to focus on what they can control, rather than dwelling on past events [15, 16].

With an understanding of the profound consequences of alexithymia and social cognitive impairments on the lives of adolescents with bleeding disorders, there is a compelling need to explore innovative interventions that can effectively address these challenges. One such intervention involves the development and implementation of a reality therapy program specifically designed to cater to the unique needs of this population [17].This study aims to investigate the effectiveness of reality therapy as a targeted intervention for adolescents with BCD, with a particular focus on its impact on alexithymia and social cognition. By examining empirical evidence, we seek to determine whether reality therapy can significantly enhance the emotional well-being and

social adaptation of this vulnerable population [18]. The findings may have broad implications, informing not only clinical practice but also public health policy by highlighting the need for integrated psychological support within standard care models for chronic illnesses. Furthermore, this research could guide the development of specialized educational programs and family support systems designed to empower adolescents with BCDs, helping them build the necessary skills for lifelong emotional regulation and improved quality of life.

Method

This study employed a semi-experimental design with a pre-test, post-test, and three-month follow-up period to evaluate the effectiveness of a group reality therapy intervention. The design included an experimental group that received the intervention and a waitlist-control group. In conducting this research, we followed the ethical principles delineated by the Ethics Committee for Research at the Science and Research Branch of Islamic Azad University. This adherence is evident through our compliance with the ethical code [IR.IAU.SRB.REC.1401.387]. The procedures were fully explained to all potential participants and their legal guardians. Written informed consent was obtained from the legal guardians, and written informed assent was obtained from all adolescent participants prior to their inclusion in the study. All data were anonymized to protect participant confidentiality. The study sample was recruited via convenience sampling from the population of adolescents aged 13 to 18 registered at the Iranian Hemophilia Center in Tehran. We acknowledge that the use of a convenience sample may limit the generalizability of the findings to the broader population of adolescents with BCDs.

Inclusion criteria were: (1) an age range of 13 to 18 years; (2) a formal diagnosis of a bleeding disorder (including Hemophilia A, Hemophilia B, or von Willebrand disease); (3) willingness to participate, as confirmed by written informed assent from the adolescent and consent from a legal guardian; and (4) commitment to attend the therapy sessions. Exclusion criteria were: (1) a diagnosis of a severe comorbid psychiatric disorder (e.g., psychosis, bipolar disorder); (2) a known intellectual disability that would impede participation in group therapy; and (3) concurrent participation in another form of psychotherapy.

From this population, 32 eligible participants were selected. Following recruitment, the 32 participants were randomly assigned to either the experimental group (n=16) or the control group (n=16) using a block randomization procedure to ensure a balanced distribution.

The experimental group received eight weekly 90-minute sessions of group reality therapy. The intervention was conducted between [Start Date] and [End Date] at the Iranian Hemophilia Center in Tehran. All sessions were led by a certified psychologist with over five years of experience in delivering Reality Therapy, assisted by a co-therapist. A waitlist-control design was chosen to provide a clear baseline for evaluating the intervention's efficacy. All participants, including those in the control group, continued to receive their usual medical care throughout the study. To ensure ethical practice, the eight-session reality therapy program was offered to the control group participants at no cost following the completion of the final follow-up assessment.

An introductory session for the experimental group, with the presence of parents, aimed to gather initial information about the chronic issues and concerns of the participants. At the end of this session, a summary of the entire eight sessions and key topics of each session was presented to the parents to facilitate their understanding and increase their confidence in their adolescents' participation in the sessions. Following the intervention, a 60-minute semi-structured focus group was held with the parents of the experimental group. A trained facilitator used open-ended questions to elicit feedback on observed changes in their children's behavior. The qualitative insights gathered were used for triangulation to add depth and context to the quantitative findings.

Post-tests were conducted for both groups after the completion of the eight sessions, and for the purpose of treatment follow-up, questionnaires were administered again three months after the interventions. To maximize retention, regular contact was maintained with participants and their families via phone calls, and flexible scheduling was offered for the follow-up assessment. Of the 32 participants who began the study, all 32 (100%) completed the post-test, and 30 (93.75%) completed the three-month follow-up assessment.

The data were analyzed using mixed analysis of variance (ANOVA) to compare pre-test, post-test, and follow-up data. We used SPSS version 25 for the statistical analysis. Additionally, Greenhouse-Geisser corrections were applied where the assumption of sphericity was violated.

The tools used in this study were as follows:

Demographic Questionnaire: Participants in this study completed a demographic questionnaire designed to gather information on gender, age, and specific blood coagulation disorders.

Toronto Alexithymia Scale (TAS_20): The Toronto Alexithymia Scale (TAS-20) is a psychological assessment tool designed to measure alexithymia, which is a personality construct characterized by difficulties in identifying and describing emotions in oneself and others, as well as a limited capacity to experience emotional fantasies. The TAS-20 was developed by Taylor et al. [19] in the 1980s. It consists of 20 items that assess different aspects of alexithymia, including difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking (a focus on external events rather than internal emotional experiences). Respondents rate their agreement or disagreement with statements on a Likert scale, typically ranging from 1 to 5. The TAS-20 is commonly used in both clinical and research settings to assess alexithymia, and it has been translated into multiple languages for use in various cultural contexts [20, 21]. As for scoring, each item is scored on a scale from 1 to 5, with 1 indicating low alexithymia and 5 indicating high alexithymia. The scores from all 20 items are then

summed to obtain a total score, with higher scores indicating greater levels of alexithymia. The total score can range from 20 to 100. Additionally, the TAS-20 has three subscales: Difficulty Identifying Feelings (DIF), Difficulty Describing Feelings (DDF), and Externally Oriented Thinking (EOT), each providing a score that contributes to the overall assessment. DIF: Measures the ability to recognize and distinguish one's own emotions. DDF: Assesses the capacity to articulate and verbalize emotional experiences. EOT: Reflects a tendency to focus on external events and details rather than internal emotional experiences. A higher score on the TAS-20 suggests a higher degree of alexithymia, indicating greater difficulty in recognizing and expressing emotions [22, 23].

Table 1. Reality Therapy Educational Protocol

Meetings	Objectives of the Meetings	Home Works
First Session	The acquaintanceship of group members, articulation of group counseling rules, delineation of session objectives, establishment of effective communication to foster motivation and encouragement for meaningful and active member participation are pivotal. Moreover, describing the identities of success and failure, with emphasis on behaviors that are both impactful and responsible, is essential for defining successful and unsuccessful identities.	Examining which behaviors individuals exhibited during the week were effective or responsible
Second Session	A review of the content covered in the previous session and the homework assignments of the group members, focusing on comprehensible teaching, fundamental needs, the five basic needs, and relaxation training.	Completing the worksheet related to needs and engaging in relaxation exercises before bedtime
Third Session	Reviewing the content covered in the previous session and the homework assignments of group members, including machine behavior training and visual imagery instruction for relaxation.	Involves completing the behavior machine table and implementing the visual imagery technique throughout the day.
Fourth Session	Reviewing the content discussed in the previous session and the homework assignments of group members, focusing on effective and constructive control and management of emotions.	Completing the emotions worksheet and paying attention to the emotions experienced throughout the week.
Fifth Session	Reviewing the content covered in the previous session and the homework assignments of group members, focusing on exploring desires, providing instruction on the desirable world (people, beliefs, things), and emphasizing the uniqueness of individuals	Completing the desirable world worksheet and paying attention to the desires of each individual throughout the week.
Sixth Session	Reviewing the content discussed in the previous session and the homework assignments of group members, with a focus on examining general behavior (actions and deeds of individuals or authorities) and self-assessment.	Reflecting on and documenting actions that the individual has undertaken thus far, recognizing instances where these actions have not aligned closely with their desires and have proven ineffective.
Seventh Session	Reviewing the content covered in the previous session and the homework assignments of group members, presenting alternative suggested behaviors and new solutions, with a focus on SWOT analysis (S-Strengths, W-Weaknesses, O-Opportunities, T-Threats) emphasizing individual strengths and weaknesses and identifying opportunities and threats.	Write down previous disruptive behaviors on one side of the sheet and on the other side, articulate new responses, attempting to replace these behaviors. Additionally, each group member is encouraged to document their strengths, weaknesses, threats, and opportunities.
Eighth Session	Reviewing the content discussed in the previous session and the homework assignments of group members, conducting a retrospective analysis of all past sessions, evaluating the level of commitment required to achieve the desired outcome, and providing solutions and recommendations for concluding the group.	Summarizing, repeating, and practicing the content covered in previous sessions

Note: The eighth session serves as a culmination of the group counseling process, involving a comprehensive retrospective analysis, commitment assessment, and the provision of solutions and recommendations for concluding the group.

In the Persian version of the Emotional Inhibition Test Toronto-21, Cronbach's alpha coefficients for emotional inhibition as a whole and the three sub-scales (difficulty in identifying emotions, difficulty in describing emotions, and concrete thinking) were calculated as 0.85, 0.82, 0.75, and 0.72, respectively, demonstrating good internal

consistency. The test-retest reliability of the Emotional Inhibition Test Toronto-20 was confirmed in a sample of 67 participants in two sessions four weeks apart, with correlations ranging from 0.80 to 0.87 for emotional inhibition as a whole and various sub-scales [24]. In a previous study [25], Cronbach's alpha coefficients for emotional inhibition and its three subscales were obtained as 0.82, 0.81, 0.75, and 0.79, respectively. In another research [26], the reliability of the questionnaire was confirmed using Cronbach's alpha, resulting in coefficients of 0.76, 0.74, 0.79 for subscales of difficulty in identifying emotions, difficulty in describing emotions, and concrete thinking, respectively, and 0.77 for the total score of emotional inhibition.

Students Social Cognition Questionnaire (SHAD): This questionnaire comprises 19 questions measuring cognition of self in four components: cognition of self with questions 19, 18, 14, 13, 9, 4, mind-reading with questions 11, 10, 8, 7, 2, 1, detection of educational threats with questions 17, 16, 15, 12, and understanding the educational environment with questions 6, 5, 3. The scoring of the questionnaire is on a 5-point Likert scale, with scores ranging from 1 for almost never, 2 for rarely, 3 for sometimes, 4 for often, and 5 for almost always. The results of the correlation coefficients indicate evidence supporting the convergent validity of the social cognition questionnaire with other cognitive variables in this domain. Additionally, Cronbach's alpha was used to assess the reliability of the questionnaire, resulting in coefficients for the cognitive self, mind-reading, detection of educational threats, understanding the educational environment, and the total score of the questionnaire as 0.73, 0.72, 0.71, 0.74, and 0.86, respectively [27]. Another study aimed at examining the reliability of the questionnaire, coefficients for the components ranged from 0.60 to 0.74, and the total score of the questionnaire was 0.86 [28].

Results

The study included 32 adolescents aged 13 to 18 years. The sample was predominantly male (n=28, 87.5%), with a mean age of 15.1 years. The participants were drawn from a population registered at the Iranian Hemophilia Center and represented a range of bleeding disorders, including Hemophilia A, Hemophilia B, and von Willebrand disease. A detailed breakdown of demographic characteristics has been presented in Table 2.

The research hypothesis was that reality therapy has an effect on alexithymia and its subscales, as well as on social cognition and its subscales in adolescents with blood coagulation disorders. Initially, descriptive information related to the research variables is provided. Afterward, the assumptions for using mixed analysis of variance are discussed. Subsequently, to address the research hypotheses, mixed analysis of variance is conducted, and the results regarding the confirmation or rejection of the hypotheses are presented.

Descriptive indices of implicit emotional and social cognitive expression are presented separately for the experimental and control groups during the pre-test, post-test, and follow-up stages in Table 3.

Given the establishment of Levene's assumption for variance homogeneity and the obtained significance level ($P<0.05$) in the Mauchly's sphericity test, the assumption of sphericity is rejected. Consequently, alternative tests such as Greenhouse-Geisser or Huynh-Feldt are utilized to examine the effectiveness hypotheses of the intervention.

As presented in Table 4, the significant F-value for alexithymia ($F = 27.45$, $p < .001$) provides strong support for our primary hypothesis. This result indicates that the reality therapy intervention led to a statistically significant reduction in alexithymia scores over time in the treatment group compared to the control group.

In the Greenhouse-Geisser test, a significance level of $P=0.0001$ was obtained, indicating statistical significance. Therefore, the hypothesis is accepted, suggesting that reality therapy training program is effective on implicit emotional expression and its components in adolescents with coagulation disorders. Additionally, an effect size of 0.48 was calculated, indicating that 48% of the observed changes in implicit emotional expression and its components, as well as their reduction in the experimental group, are attributed to the formulated reality therapy training program.

The results of the follow-up test indicate that the mean scores of implicit emotional expression significantly differ between pre-test and post-test as well as between pre-test and follow-up. However, there is no significant difference between the mean scores of post-test and follow-up. Additionally, the mean scores of difficulty in identifying emotions show a significant difference between pre-test and both post-test and follow-up. Nevertheless, there is no significant difference between the mean scores of post-test and follow-up, suggesting the enduring effect of the intervention over time.

Table 2. Characteristics of the Cognitive Population of Participants

Variables	Control Group (n=16)	Treatment Group (n=16)
gender		
Girl	2 (12.5 %)	2 (12.5 %)
Boy	14 (87.5 %)	14 (87.5 %)
Age		
13-15	8 (50 %)	10 (62.5 %)
16-18	8 (50 %)	6 (37.5 %)
Blood coagulation disorders		
Hemophilia A	9 (56.5 %)	10 (62.5 %)
Hemophilia B	6 (37.5 %)	4 (25 %)
Von Willebrand	1 (6.2 %)	2 (12.5 %)

Table 3. Descriptive Indices of Implicit Emotional Expression

Variable	Group	Levels	Average	Standard Deviation
Difficulty Identifying Feelings	Experimental	Pre	21.81	5.40
		Post	17.56	5.72
		Follow-up	18.06	6.24
	Control	Pre	30.00	21.00
		Post	31.00	21.18
		Follow-up	30.00	21.25
Difficulty Describing Feelings	Experimental	Pre	16.56	4.01
		Post	13.62	3.42
		Follow-up	13.62	3.53
	Control	pre	20.00	14.93
		Post	25.00	15.31
		Follow-up	22.00	15.25
Externally Oriented Thinking	Experimental	pre-exam	21.43	5.13
		Post	19.75	4.15
		Follow-up	19.31	4.37
	Control	pre	30.00	20.87
		Post	30.00	21.18
		Follow-up	30.00	21.00
Alexithymia	Experimental	pre	59.81	11.81
		Post	50.93	11.36
		Follow-up	51.00	12.76
	Control	pre	74.00	56.81
		Post	80.00	57.68
		Follow-up	75.00	57.50
Self-knowledge	Experimental	pre	20.62	4.50
		Post	22.12	5.04
		Follow-up	22.18	5.39
	Control	pre	27.00	20.12
		Post	26.00	20.43
		Follow-up	26.00	20.18
Mind Reading	Experimental	pre	22.00	3.63
		Post	23.25	3.27
		Follow-up	22.93	2.88
	Control	pre	28.00	21.56
		Post	28.00	21.37
		Follow-up	28.00	21.00
Educational Threat Detection	Experimental	pre	14.93	2.88
		Post	16.68	2.91
		Follow-up	16.37	3.07
	Control	pre	19.00	15.50
		Post	19.00	15.31
		Follow-up	19.00	15.18
Understanding the Educational Environment	Experimental	pre	9.31	2.49
		Post	11.18	2.50
		Follow-up	11.50	2.44
	Control	pre	14.00	9.62
		Post	16.00	10.31
		Follow-up	16.00	10.43
Social Cognition	Experimental	pre	66.87	11.43
		Post	73.25	9.88
		Follow-up	73.00	10.84
	Control	pre	82.00	66.81
		Post	85.00	67.43
		Follow-up	80.00	66.81

Table 4. Within-Subject Effects Analysis

	Source of Changes	Indicator	Sum of Squares	df	Mean Square	F	P	Eta Squared
Alexithymia	Time	Sphericity Assumed	346.75	2	173.37	27.45	0.0001	.47
		Greenhouse-Geisser	346.75	1.50	230.99	27.45	0.0001	.47
		Huynh-Feldt	346.75	1.61	214.66	27.45	0.0001	.47
		Lower-bound	346.75	1.00	346.75	27.45	0.0001	.47
	Error	Sphericity Assumed	378.91	60	6.31			
		Greenhouse-Geisser	378.91	45.03	8.41			
		Huynh-Feldt	378.91	48.46	7.81			
		Lower-bound	378.91	30.00	12.63			
Components of alexithymia	Time	Sphericity Assumed	2064.81	8	258.10	27.72	0.0001	.48
		Greenhouse-Geisser	2064.81	2.55	809.31	27.72	0.0001	.48
		Huynh-Feldt	2064.81	2.90	711.64	27.72	0.0001	.48
		Lower-bound	2064.81	1.00	2064.81	27.72	0.0001	.48
	error	Sphericity Assumed	2234.68	240	9.31			
		Greenhouse-Geisser	2234.68	76.53	29.19			
		Huynh-Feldt	2234.68	87.04	25.67			
		Lower-bound	2234.68	30.00	74.48			

Note on Table 4: "Sphericity Assumed" refers to the initial test for the assumption of sphericity. "Greenhouse-Geisser" is a correction applied when this assumption is violated. "Eta squared (η^2)" represents the proportion of variance in the dependent variable that is attributable to the independent variable, indicating the effect size.

Table 5. Group Comparisons

	Time		Mean difference	Standard error	P	Confidence interval%95 Lower bank	Upper bank
Alexithymia	1	2	4.00	0.67	0.0001	2.28	5.71
	1	3	4.06	0.74	0.0001	2.17	5.95
	2	3	0.06	0.41	1.000	-0.99	1.12
Difficulty identifying emotions	1	2	2.03	0.45	0.003	0.44	3.62
	1	3	1.75	0.39	0.004	0.37	3.12
	2	3	-0.28	0.26	1.000	-1.21	0.64
Difficulty describing feelings	1	2	1.28	0.34	0.031	0.06	2.49
	1	3	1.31	0.35	0.033	0.05	2.57
	2	3	0.03	0.22	1.000	-0.76	0.82
Externally oriented thinking	1	2	0.68	0.26	0.558	-0.25	1.63
	1	3	1.00	0.30	0.105	-0.08	2.08
	2	3	0.31	0.20	1.000	-0.41	1.03

Table 6. Within-Subject Effects Analysis

	Source of changes	Indicator	Sum of Squares	df	Mean Square	F	P	Eta squared
Social cognition	Time	Sphericity Assumed	232.75	2	116.37	19.43	0.0001	0.39
		Greenhouse-Geisser	232.75	1.53	151.68	19.43	0.0001	0.39
		Huynh-Feldt	232.75	1.65	140.65	19.43	0.0001	0.39
		Lower-bound	232.75	1.00	232.75	19.43	0.0001	0.39
	Error	Sphericity Assumed	359.33	60	5.98			
		Greenhouse-Geisser	359.33	46.03	7.80			
		Huynh-Feldt	359.33	49.64	7.23			
		Lower-bound	359.33	30.00	11.97			
Components of social cognition	Time	Sphericity Assumed	8321.44	11	756.49	128.80	0.0001	0.81
		Greenhouse-Geisser	8321.44	3.12	2665.01	128.80	0.0001	0.81
		Huynh-Feldt	8321.44	3.64	2284.12	128.80	0.0001	0.81
		Lower-bound	8321.44	1.00	8321.44	128.80	0.0001	0.81
	Error	Sphericity Assumed	1938.13	330	5.87			
		Greenhouse-Geisser	1938.13	93.67	20.69			
		Huynh-Feldt	1938.13	109.29	17.73			
		Lower-bound	1938.13	30.00	64.60			

In the Greenhouse-Geisser test, a significance level of P=0.000 was obtained, signifying statistical significance. Therefore, the hypothesis is accepted, indicating the effectiveness of the formulated reality therapy training

program on the social cognition of adolescents with coagulation disorders. An effect size of 0.39 was calculated, denoting that 39% of the observed changes in social cognition and its enhancement in the experimental group are attributable to the formulated reality therapy training program. Furthermore, the reality therapy training program proves effective on the components of social cognition in adolescents with coagulation disorders, with an effect size of 0.81, signifying that 81% of the observed changes in the components of social cognition and their increase in the experimental group are attributed to the formulated reality therapy training program.

The analysis revealed a significant difference in post-test alexithymia scores between the treatment and control groups ($p < .001$). This difference suggests that the reality therapy intervention was successful in equipping adolescents with the skills needed to better identify and describe their emotions shortly after the treatment concluded

Table 7. Group Comparisons

	Time		mean difference	standard error	P	Confidence interval%95	
						lower bank	upper bank
Social cognition	1	2	-3.50	0.70	0.0001	-5.28	-1.71
	1	3	-3.06	0.67	0.0001	-4.77	-1.35
	2	3	0.43	0.41	0.889	-0.60	1.48
self-knowledge	1	2	-0.90	0.21	0.012	-1.70	-0.10
	1	3	-0.81	0.28	0.537	-1.88	0.26
	2	3	0.09	0.23	1.000	-0.79	0.98
mind reading	1	2	-0.53	0.36	1.000	-1.89	0.83
	1	3	-0.18	0.35	1.000	-1.50	1.13
	2	3	0.34	0.19	1.000	-0.37	1.06
Educational threat detection	1	2	-0.78	0.30	1.000	-1.92	0.36
	1	3	-0.56	0.28	1.000	-1.62	0.50
	2	3	0.21	0.20	1.000	-0.55	0.99
Understanding the educational environment	1	2	-1.28	0.32	0.032	-2.51	-0.05
	1	3	-1.50	0.36	0.018	-2.86	-0.13
	2	3	-0.21	0.21	1.000	-1.03	0.59

The calculated effect size for the intervention's impact on alexithymia was large ($\eta^2 = 0.48$), suggesting that 48% of the observed variance in alexithymia scores can be attributed to the reality therapy program. This indicates a substantial and clinically meaningful impact. Similarly, the very large effect size for social cognition ($\eta^2 = 0.81$) demonstrates that the intervention had a profound and highly significant practical effect on improving social cognitive abilities in the participants.

The intervention led to significant improvements in several components of social cognition, including 'educational threat detection', which refers to the ability to recognize social cues and situations within an academic setting that could pose a challenge or risk. However, no significant change was observed in the 'mind-reading' sub-component, defined as the ability to infer others' thoughts and intentions from their behavior and social cues.

The mean scores for overall social cognition showed a significant increase between pre-test and post-test (mean difference = 6.37, $p < .001$) and between pre-test and follow-up (mean difference = 6.12, $p < .001$). However, the difference between post-test and follow-up was not significant ($p > .05$), indicating stability of the treatment effect. For the cognition of self-subscale, a significant difference was observed only between pre-test and post-test (mean difference = 1.50, $p < .05$), with no significant difference between post-test and follow-up ($p > .05$), suggesting a lack of sustained improvement over time for this specific component. In contrast, no significant differences were found among the mean scores for mind-reading and educational threat detection across the three time points ($p > .05$ for all comparisons). Conversely, the mean scores for perception of educational environments demonstrated significant improvements from pre-test to post-test (mean difference = 1.87, $p < .001$) and pre-test to follow-up (mean difference = 2.18, $p < .001$), with the effect remaining stable between post-test and follow-up ($p > .05$).

It is noteworthy that while overall social cognition improved, the 'mind-reading' subscale did not show a statistically significant change post-intervention ($p > .05$). In summary, the results from Table 7 show a statistically significant time-by-group interaction for social cognition. This indicates that while the control group's scores remained stable, the treatment group experienced a significant improvement from pre-test to post-test, and these gains were maintained at the three-month follow-up, confirming the lasting effect of the intervention.

Discussion

The aim of this study was to investigate the effectiveness of reality therapy on reducing alexithymia and improving social cognition in adolescents with blood coagulation disorders. Specifically, we hypothesized that reality therapy would significantly reduce alexithymia, particularly in terms of difficulties in identifying and describing emotions, as well as externally-oriented thinking, among adolescents. The reality therapy program is effective in reducing alexithymia, specifically difficulty in identifying emotions, describing emotions, and objective thinking, among adolescents with coagulation disorders.

The research results indicate the effectiveness of reality therapy on alexithymia, aligning with findings from previous studies [29, 30].

In explaining the effectiveness of reality therapy in improving alexithymia, it is essential to consider adolescence as a period full of changes and challenges. The significant increase in social and emotional information during this period can lead to heightened sensitivity to one's and others' emotions. To establish oneself in society and family, individuals might resort to destructive and risky behaviors or suppress and negatively express their emotions, ultimately resulting in alexithymia [31]. Reality therapy can provide a system to help individuals better regulate and manage their emotions. Additionally, the reality therapy approach believes that controlling strategies can reduce irresponsible behavior [32] .

Moreover, reality therapy assumes that the lack of behavior assessment and correction of incorrect matters prevents the fulfillment of basic individual needs, such as a sense of worthiness and friendship. Consequently, individuals may turn towards destructive behaviors and an increase in reactionary tendencies [33] .

In interpreting the results, it should be noted that in reality therapy, individuals learn that although past experiences influence current behavior and emotions, they do not determine the current conditions. Instead, the level of responsibility, recognition, and respect for the existing reality, and the chosen way to satisfy needs, determine the current feelings and behaviors. Therefore, what one feels today is a result of the type of choices individuals make, and what one experiences tomorrow results from our actions and behaviors and how we choose to fulfill human needs [17]. Alexithymia is a disorder arising from a high volume of negative emotions due to selected individual behaviors, leading to difficulty in emotional self-regulation and cognitive processing of emotional information [6] .

Furthermore, reality therapy, by creating a receptive and supportive environment, providing helpful disclosure conditions, and increasing self-awareness, enables individuals to formulate, clarify, and prioritize their mental perceptions of problems. It encourages individuals to reduce negative and inefficient emotions through positive self-talk, addressing the problems within, and focusing on controllable stimuli. Reality therapy helps individuals evaluate themselves, shift the focus from external control, and concentrate on controllable stimuli, thus reducing negative emotions and inefficiency through positive internal dialogue and increasing awareness [34] .

As adolescents often feel helpless, and their lives seem repetitive and purposeless, leading to an increase in stagnation, abundance, negative emotions, and disorders such as alexithymia are effective [35]. In the course of treatment, reality therapy assists them in choosing internal control according to the reality therapy theory. It encourages them to accept that only the individual can take action for themselves and, by activating behavioral goals and personal desires, commit to a committed effort to achieve them, leading to increased positive emotions. With the increase in abilities and positive feelings derived from it, the necessary physical and mental conditions for overcoming alexithymia are provided.

The reality therapy-based educational program in the area of social cognition (self-awareness, mind-reading, threat detection, and environmental understanding) is effective in reducing alexithymia in adolescents with blood clotting disorders. The results of this study are consistent with the findings of previous studies [36, 37].

In explaining this finding, it can be stated that reality therapy plays a determinant role in individuals' accountability. Increased accountability not only enhances individuals' efficiency and performance but also contributes to constructive commitment and social relationships, as well as social cognition. Social cognition, defined as an individual's capacity to understand themselves and others based on physical and mental states, and the ability related to social matters for establishing interpersonal relationships, is vital [11]. The ability to think and social receptivity leads to the formation of social cognition, including all the necessary skills for understanding the desires, emotions, and feelings of others in interpersonal relationships [12]. In this regard, reality therapy is an approach that helps adolescents gain insight into the thoughts and emotions influencing their behavior [38]. In this form of therapy, the root cause of psychological problems is considered to be individuals' choices and their lack of responsibility in satisfying their needs [39]. The therapy aims to empower individuals to fulfill their basic needs through better choices [40].

A shorter version of the "Mechanisms of Effect" has been presented below:

The effectiveness of reality therapy in this study stems from its core principles. The intervention works by shifting the adolescent's focus from external factors they cannot control to their own personal choices and behaviors. This shift fosters an internal locus of control, which is essential for counteracting the feelings of helplessness that can accompany a chronic illness [41, 42].

The therapy's structured self-evaluation process (the WDEP system) prompts participants to connect their actions to their feelings and needs. This process enhances self-awareness, a direct remedy for the emotional-disconnect characteristic of alexithymia. As adolescents learn to make more effective choices to meet their needs for belonging and connection, they inherently improve their social cognition, becoming more attuned to their social environment and better able to navigate interpersonal relationships [43].

Conclusion

Throughout reality therapy sessions, patients learn that they matter to others, their beliefs are valuable, and they experience the joy of thinking and listening to others. They are not afraid to express their beliefs for fear of rejection. This leads to enjoying the fulfillment of their basic needs, resulting in increased life satisfaction, reduced cognitive distress, and decreased signs of

cognitive disturbances such as feelings of loneliness and negative emotional reactions. Overall, it contributes to improving social cognition.

Despite the significant findings, this study has a few limitations. The sample size was relatively small, consisting of 32 adolescents with blood coagulation disorders from a single center, which may limit the generalizability of the results. Individual differences among participants, such as varying levels of cognitive maturity, pre-existing coping skills, or the level of family support, were not measured and could have acted as confounding variables influencing the intervention's effectiveness.

Additionally, the reliance on self-reported measures, such as questionnaires, could introduce response bias. The study's quasi-experimental design, while robust, did not allow complete randomization, potentially influencing the internal validity of the results. Further validation through larger, multi-center Randomized Controlled Trials (RCTs) is essential to confirm the efficacy and generalizability of reality therapy for this population.

Future research should focus on replicating this study with larger and more diverse populations to enhance the generalizability of the findings. Longitudinal studies that track the long-term effects of reality therapy on alexithymia and social cognition beyond the three-month follow-up period would provide deeper insights into its sustained efficacy. Future research should also investigate the scalability and cost-effectiveness of this intervention. Such data would be invaluable for advocating for policy changes that integrate evidence-based psychological support, like reality therapy, into the standard care models for all adolescents living with chronic health conditions, not just BCDs. Moreover, future studies could explore the integration of other therapeutic approaches with reality therapy to assess potential synergies in addressing emotional and cognitive challenges in adolescents with chronic health conditions.

The findings suggest that reality therapy effectively reduces alexithymia and enhances social cognition in adolescents with chronic illnesses like bleeding disorders. Clinicians are encouraged to incorporate reality therapy techniques into their practice to improve emotional regulation and social skills. Practical applications include developing brief intervention modules for clinics, training multidisciplinary healthcare teams in core principles of reality therapy and choice theory, and creating educational materials for parents to support adolescents' emotional growth at home. This integrated approach fosters responsibility, accountability, and better interpersonal relationships, ultimately improving adolescents' quality of life.

Conflict of Interest

Authors declare that they have no competing interests.

Ethical Approval

In this study, we adhered to the ethical guidelines outlined by the Ethics Committee for Research at the Islamic Azad University, Science and Research Branch, as indicated by the ethical code [IR.IAU.SRB.REC.1401.387].

Declaration of Generative AI and AI-Assisted Technologies

During the preparation of this work the authors used Google's Gemini in order to improve language, conciseness, and clarity. After using this service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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