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The Impact of Cognitive-Behavioral on Mathematical Anxiety and Self-Perception among Students with Math Disoders Indicators and Elements of Social Justice in the Qur'anic Perspective

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ABSTRACT

The current research has investigated the effect of cognitive behavioral therapy on math anxiety and math self-concept of students with learning disabilities in math lessons. The independent variable of research, therapy cognitive behavioral was carried out during tewle sessions and during two months on the dependent variables, i.e. , so that the average scores of the post-test of mathematical self-concept of the experimental group compared to the group The evidence increased and the average scores of the post-test of math anxiety in the experimental group decreased compared to the control group. The statistical population was students with math disorder of Shariati exceptional school 2 in Shahrekord city. The sample size of 38 people (19 people in the experimental group and 19 people in the control group) qualified volunteers were included in the study by available sampling method and were randomly divided into two experimental and control groups. Data analysis was done using univariate analysis of variance with SPSS-25 software. The results showed that the pre-test and post-test scores of the experimental group are significant ($p<0.001$). The results showed that the cognitive-behavioral approach was effective in increasing the mathematical self-concept and reducing the mathematical anxiety of people, which means that the cognitive therapy training contributed 21% in reducing the mathematical anxiety and 11% in increasing the mathematical self-concept of the students.

Key words: Cognitive-behavioral, Mathematical anxiety, Mathematical self-concept, Mathematical disorder

INTRODUCTION

Over the past few years, there has been a growing number of students experiencing difficulties in learning mathematics across various educational stages. The notion of a learning disability in mathematics can be traced back to the establishment of a widely-used categorization system for psychiatric disorders by the American Psychiatric Association, known as the Diagnostic and Statistical Manual of Psychiatric Disorders. This system has evolved through five versions, and it was in the DSM-III-TR that a mathematical disorder was first recognized as a distinct condition. Subsequently, due to certain limitations in this edition that necessitated updates, the DSM-V was developed. In this latest version, a learning disability in mathematics is classified as a "specific learning disorder" or "dyscalculia." Symptoms of this disorder encompass insufficient focus and concentration, poor memory retention, challenges in comprehending and acquiring new information, and a deficit in mathematical logic, each presenting in different intensities: mild, moderate, or severe [1]. Students with mathematical learning disabilities often struggle with decoding, memorization, and the retrieval of information. Essentially, these students face obstacles in their ability to process

information, which can be categorized into three main areas: perception, cognition, and learning.

These aspects encompass the identification of mathematical terminology, the utilization of mathematical procedures and principles (language process), the ability to recognize all components of a problem and perceive them accurately (visual-spatial processing), the swift examination of problems (processing speed), the precision and concentration required to solve problems and commit them to memory (attention), the retention and learning strategies for mathematical information, and Executive functions [2]. In terms of the prevalence of learning disabilities, it has been determined that they affect between five to fifteen percent of school-aged students [1]. Conversely, it is estimated that learning disabilities specifically related to mathematics occur in approximately five to eight percent of students [3]. Math anxiety is a significant obstacle to the acquisition of mathematical skills, and this phenomenon has garnered interest from researchers and psychologists alike [4].

Richardson & Suinn conceptualize math anxiety as a state of bewilderment, cognitive disarray, apprehension, and fear, accompanied by stress and a sense of inadequacy when one encounters or attempts to solve mathematical problems [5]. Identifying the manifestations of math anxiety involves observing indicators such as anxiety, fear, aversion, and behaviors indicative of stress, failure, cognitive dissonance, agitation, and a feeling of powerlessness [6]. Humanistic psychologists attribute significant importance to the "self," positing that it is instrumental in determining professional success, educational attainment, personal identity, well-being, and every facet of human conduct [7]. Self-concept encompasses our self-perceptions, emotions, and cognitions [8]. It can be dissected into three components: 1) the self-image we cultivate, 2) self-esteem, which reflects the degree of self-love and acceptance, and 3) the ideal self, representing our aspirations and the qualities we endeavor to embody [9].

Cognitive Behavioral Therapy (CBT) stands as a therapeutic modality designed to convert detrimental thoughts into positive and productive ones. Initially developed by Aaron Beck, this technique was first applied in the treatment of depression. It is characterized by its brevity, cost-efficiency, adaptability, and the absence of a need for medication or significant financial outlay. CBT concentrates on the present, eschews exploration of the past, and is devoid of side effects [10]. Sukhodolsky and colleagues performed a meta-analysis that scrutinized 16 studies investigating the effects of cognitive-behavioral interventions on the psychological well-being of adolescents with learning disabilities. Their findings indicated that such interventions were successful in diminishing aggression, anxiety, and depressive symptoms, while concurrently promoting mental health [11].

Ma's research showed that alleviating math anxiety results in enhanced mathematical proficiency, propelling individuals from the 50th to the 71st percentile, thereby establishing the significant impact of math anxiety on forecasting academic advancement in mathematics at various educational stages [12]. In a study aptly named "The Role of Personal Variables in Mathematical Progress," Kabiri *et al*. examined 366 students in lower secondary education, revealing a negative correlation between math anxiety and students' academic achievement [13]. Morsanyi, Busdraghi, and Harari, through their investigation among high school students, uncovered that cognitive and metacognitive processes, including working memory, critical thinking, and mental structuring, are positive predictors of mathematical understanding and negative predictors of both math anxiety and examination anxiety [14].

Shannon and Allen's study explored the efficacy of instructing cognitive strategies to enhance the mathematical skills of 11th-grade students within a California educational district. The findings revealed that participants in the experimental group exhibited a notable enhancement in their mathematical capabilities following eight weeks of training [15]. In Iran, Maleki conducted a study entitled "The Impact of Teaching Cognitive and Metacognitive Strategies on Enhancing Learning and Retention of Different Educational

Texts." This investigation included 270 freshman high school students in Tehran and determined that the application of cognitive strategies resulted in better performance in subjects requiring understanding, such as mathematics, while no correlation was found between the use of metacognitive strategies and mathematical achievement [16].

Addressing learning disabilities in mathematics is essential, not only because of their immediate effect on students' educational advancement but also due to their influential role in the development of students' self-perception and self-worth. Math anxiety, a common companion to these disabilities, can impair students' ability to learn and hinder their path to scholastic achievement. Regrettably, despite the significance of this matter, there is an insufficiency of research on efficacious treatments and coping mechanisms for math anxiety. The purpose of this investigation is to explore the cognitive-behavioral effects on math anxiety and the mathematical self-concept, aiming to offer tactics for enhancing academic performance and elevating students' self-assurance. The outcomes of this research have the potential not only to refine pedagogical approaches but also to contribute significantly to the creation of impactful educational curricula. Consequently, the current study was undertaken to ascertain the efficacy of cognitive-behavioral teaching on math anxiety and the mathematical self-concept in students with learning disabilities in mathematics.

Materials and Methods

This research employed a quasi-experimental methodology featuring a pretest-posttest design with the inclusion of a control group. The study's statistical population encompassed all students diagnosed with a mathematical disorder at Shariati 2 Special School in Shahrekord during the year 2018. Although experimental studies typically require a minimum of 15 participants [17], this research aimed to enhance external validity by engaging 38 volunteers—19 in the experimental group and 19 in the control group—who fulfilled the necessary criteria and were chosen via convenience sampling [18]. These participants were randomly distributed between the experimental and control groups. The determination of the sample size was informed by previous research [14-16], with calculations based on a 95% confidence level, 85% statistical power, a 30% effect size, an anticipated 10% dropout rate, and considerations of both inclusion and exclusion criteria.

Participants were considered for inclusion if they provided informed consent, met the DSM-5 criteria for a mathematical disorder, were within the age bracket of 11 to 14 years, scored below average on the math anxiety questionnaire [19] and the mathematical self-concept questionnaire [20], and had no prior history of pharmacological or cognitive therapy. Exclusion criteria encompassed absenteeism, non-cooperation, failure to meet at least three DSM-5 criteria for a mathematical disorder, and non-adherence to group rules.

The research procedure commenced with the administration of the math anxiety questionnaire [19] and the Math Self-Concept Questionnaire [21] to both groups. Following this, the control group was placed on a waiting list and received no therapeutic intervention, whereas the experimental group underwent a 12-session cognitive-behavioral therapy program over two months as part of the therapeutic intervention.

Mathematics anxiety scale [19]

The Mathematics Anxiety Scale, developed by Bai in 2011, comprises 14 items with a 5-point Likert response format, extending from "strongly disagree" (scored as 1) to "strongly agree" (scored as 5). This scale is bifurcated into two factors: the first evaluates positive mathematical influence (items 1, 3, 5, 10, 12, 13), while the second assesses negative mathematical influence (items 2, 4, 6, 7, 8, 9, 11, 14) [19]. The constructs of positive and negative mathematical influence are defined by considering the individual's perception of the significance of mathematics in their life and their passion and interest in the subject [19].

In the context of measuring math anxiety, items that gauge positive mathematical influence are scored in

reverse, such that higher scores reflect greater levels of math anxiety. Bai's study reports a test-retest reliability of 0.85 over 9 weeks and a correlation coefficient of 0.83 between the questionnaire and academic achievement [19].

The Mathematics Anxiety Scale has been subjected to validation in our country by Abdilmaleki *et al*., demonstrating a significant concurrent validity with academic achievement, self-efficacy, and negativity ($P < 0.001$) [20]. Furthermore, the questionnaire's reliability was assessed using Cronbach's alpha, resulting in scores of 0.72 and 0.65, which suggest that the Mathematics Anxiety Scale exhibits acceptable reliability within the Iranian population. The aforementioned study also found the questionnaire's reliability to be 0.70, as determined by Cronbach's alpha [20].

Mathematics self-concept scale [21]

The Mathematics Self-Concept Scale, developed by Marsh in 1990, employs the widely acknowledged Likert scale for measurement purposes. Respondents are asked to provide their answers on a five-point scale, with options ranging from "strongly agree" (scored as 1) to "strongly disagree" (scored as 5). However, in terms of scoring, a "strongly agree" response is awarded a score of 4, while a "strongly disagree" response is awarded a score of 1. The total score, which is derived from the sum of these individual scores, reflects the individual's mathematical self-concept and ranges from 20 to 100. Consequently, the lowest score a student can receive is 20, and the highest score they can achieve is 100 [21].

The objective of this scale is to assess the multifaceted aspects of mathematical self-concept, encompassing abilities and skills, the tendency to avoid mathematics, and the level of enjoyment derived from the subject [22]. This instrument comprises 20 questions and is structured around three dimensions, as detailed in **Table 1**. The table also specifies the question numbers that correspond to each dimension [23].

Table 1. Dimensions of Mathematical Self-Concept

Dimensions	**Item Numbers**	**Cronbach's Alpha Coefficients**
Abilities and Skills	7,10,13,3,18,9,6,16,5,1,19	0.835
Avoidance of Mathematics	11,8,2,17,4,14	0.847
Enjoyment of Mathematics	15,20,12	0.68

Abilities and skills

Students who achieve high scores on this factor hold the belief that they grasp mathematical concepts swiftly, perceiving mathematics as an accessible subject and a personal academic forte. Consequently, they exhibit confidence in solving mathematical problems and demonstrate self-reliance when fulfilling math assignments. This independence signifies their reduced reliance on external assistance, leading to success in mathematics examinations and the attainment of high marks.

Avoidance of mathematics

Students who steer clear of mathematics do so under the conviction that their struggle to master and engage with mathematical concepts, coupled with the challenges they encounter in fulfilling math-related tasks, has eroded their interest in the subject. Consequently, rather than deriving pleasure from mathematics, they experience ennui and harbor a feeling of disdain for it.

Enjoyment of mathematics

Students who achieve high scores on this factor do so as a result of their fervent passion and keen interest in mathematics. For them, the processes of learning, studying, and practicing mathematical problems are not only engaging but also sources of delight, leading them to regard mathematics as one of their most enjoyable subjects.

Pour-aghdam Yamchi and Behrangi's factor structure analysis of the scale revealed that it is composed of two distinct factors: interest in mathematics, comprising seven items, and perceived mathematical ability, consisting of five items, both of which contribute to the scale's cohesive structure. Furthermore, to assess the reliability of the questionnaire in the current study, the method of internal consistency was employed, yielding an overall test reliability coefficient of 0.81, with specific coefficients of 0.82 for interest in mathematics and 0.73 for perceived mathematical ability [24].

In a separate investigation by Gitau & Mwangi, which also utilized the questionnaire, the scale's reliability, and internal consistency were reported at 0.88. Within the study at hand, the internal consistency was determined to be 0.89 through the use of Cronbach's alpha [22].

Radi's study, focusing on students in Malard, evaluated the questionnaire's reliability and validity using various methods, including Cronbach's alpha for internal consistency, structural validity, and criterion validity. Pearson's correlation coefficient was applied to investigate the association between mathematical self-concept and actual mathematical performance. The questionnaire demonstrated a reliability of 0.898, with discriminant validity being statistically significant below 0.01. Moreover, the scale's criterion validity was established at 0.76 [25].

The learning disability mathematics questionnaire [26]

Malekpour designed this assessment tool to evaluate and compare the performance of students diagnosed with mathematical disabilities. It encompasses a range of subscales, including geometric shapes, size recognition, one-to-one correspondence, number counting, audio-visual integration, place value, the four fundamental arithmetic operations, and problem-solving, totaling 23 items. The questionnaire's validity was established through the discriminant validity approach, effectively distinguishing between groups with and without mathematical disabilities across all subscales, thereby demonstrating adequate validity. The reliability coefficient, ascertained using the parallel test method, was calculated to be 0.86, while the internal consistency reliability measured by Cronbach's alpha was 0.81 [26].

Cognitive-behavioral intervention sessions

The intervention comprised a series of twelve cognitive-behavioral therapy sessions, each lasting 90 minutes and held weekly over a span of two months. These sessions were structured according to Beck's therapeutic program. The efficacy of this protocol has been verified by its developers, who have attested to its robust face and content validity [27]. Furthermore, the present study corroborated the content validity of this educational package through the endorsement of five psychology professors from the University of Tehran, leading to its integration into the research. The cognitive-behavioral intervention was delivered in a group format, with **Table 2** offering a concise overview of the therapy sessions.

Table 2. Summary of Cognitive-Behavioral Therapy Sessions

Sessions	**Content of the Session**	**Exercise**

First	Introduction and familiarization with the client, pre-test administration, identification of therapeutic goals, mention of session rules, and the establishment of a therapeutic relationship.	Guided Imagery Relaxation Exercise
Second	Session Feedback from the previous session, notes from the previous session, introduction to cognitive-behavioral therapy, training in relaxation techniques, and assignment presentation.	Identifying Logical Errors Exercise
Third	Feedback from the previous session, noting negative and dysfunctional thoughts and beliefs, use of relaxation techniques, assignment presentation.	Engaging in Enjoyable and Preferred Activities Exercise
Fourth	Feedback from the previous session, teaching the downward arrow technique for identifying schemas and core beliefs, use of relaxation techniques, and assignment presentation.	Emotional Processing Improvement Technique
Fifth	Feedback from the previous session, creating a list of core beliefs, use of relaxation techniques, assignment presentation.	Thoughts Versus Probable Realities Exercise
Sixth	Session Feedback from the previous session, testing clients' beliefs with empirical analysis (judgment and evaluation), use of relaxation techniques, technique of defining terms, assignment presentation.	Progressive Muscle Relaxation Exercise

Seventh	Feedback from the previous session, use of various cognitive analysis methods, encouraging clients to reassess beliefs, explanation of cognitive errors, presentation of a list of distortions to the client, and assignment presentation.	Immersion Exercise
Eighth	Feedback from the previous session, use of relaxation techniques, challenging automatic thoughts, systematic desensitization, and assignment presentation.	Systematic Desensitization Imagination Exercise
Ninth	Feedback from the previous session, emphasis on recognizing emotions, problem-solving skills training, explanation of different types of confrontational styles, emotion regulation, downward arrow technique, and assignment presentation.	Identifying Dysfunctional Schemas Using the Downward Arrow Technique
Tenth	Feedback from the previous session, use of relaxation techniques, challenging automatic thoughts, and assignment presentation.	Logical Analysis Exercise
Eleventh	Feedback from the previous session, cognitive confrontation, use of relaxation techniques, and assignment presentation.	Voluntary Cortical Inhibition Exercise
Twelfth	Feedback from the previous session, review of exercises from the entire course, post-test administration, and conclusion.	--------

The data analysis process was bifurcated into two primary phases: descriptive and inferential statistics. Within the descriptive statistics phase, the mean and standard deviation were computed to summarize the data. For the inferential statistics phase, SPSS version 25 was utilized, and a one-way analysis of covariance (ANCOVA) was conducted to examine the differences among groups while controlling for covariates. Furthermore, the Shapiro-Wilk test was applied to test the assumption of normality in the data distribution, and Levene's test was employed to assess the assumption of homogeneity of variances across groups. The threshold for statistical significance was established at 0.01 for all tests conducted.

Results and Discussion

The current research involved an analysis of 38 subjects, evenly divided between an experimental group and a control group, with 19 participants in each. The experimental group comprised 10 females and 9 males, whereas the control group consisted of 11 females and 8 males. Among those receiving cognitive-behavioral intervention for math anxiety and mathematical self-concept, the most prevalent age was 12 years (50%), with the least represented age being 14 years (20%). Conversely, within the control group, the most common age was 14 years (48%), and the least common age was 12 years (20%).

Table 3 provides a summary of the descriptive statistical measures for the scores obtained by two groups on scales measuring math anxiety and mathematical self-concept.

Table 3. Mean and Standard Deviation of Pre-test and Post-test Scores for Math Anxiety and Mathematical Self-Concept in Experimental and Control Groups

Variable	**Group**	**Pre-test**		**Post-test**	
		Mean	**Standard deviation**	**Mean**	**Standard deviation**
Mathematical anxiety	Experimental	25.3	11.4	16.8	12.5
	Control	27.0	16.2	26.1	16.3
Mathematical Self-Concept	Experimental	21.4	6.5	25.4	6.1
	Control	23.1	6.2	23.1	4.8

As indicated in **Table 3**, the average post-test scores for mathematical self-concept in the experimental group exhibited an increase relative to the control group, whereas the average post-test scores for math anxiety in the experimental group showed a decrease in comparison to the control group. To ascertain the statistical significance of these observed differences, while accounting for the influence of pre-test scores, an analysis of covariance (ANCOVA) was employed. Before conducting the ANCOVA, the underlying assumptions of the test were scrutinized. The Shapiro-Wilk test was utilized to evaluate the normality of the post-test score distributions within both the experimental and control groups, with findings suggesting that the distributions for both variables adhered to a normal distribution ($P < 0.001$).

Levene's test was applied to investigate the homogeneity of variances for the math anxiety and mathematical self-concept variables, and the results did not warrant the rejection of the homogeneity of variances assumption ($P > 0.01$). Moreover, the interaction effect between group assignment and pre-test variables was

found to be statistically non-significant (P > 0.01), leading to the acceptance of the assumption of homogeneity of regression slopes across groups. The outcomes of the ANCOVA are detailed in **Table 4**.

Table 4. Results of One-Way Analysis of Covariance (ANCOVA) for Math Anxiety and Mathematical Self-concept in Experimental and Control Groups

Variable	Source of Variation	Sum of Squares	df	Mean Square	F Statistic	P-value	Power	Effect size
Mathematical anxiety	Group	574.1	1	574.1	9.1	0.005	0.84	0.21
	Pre-test	5426.3	1	5426.3	86.8	0.001	1.00	0.71
	Error	2185.8	35	62.4				
Mathematical Self-Concept	Group	90.7	1	90.7	4.1	0.004	0.51	0.11
	Pre-test	334.6	1	334.6	15.3	0.001	0.97	0.30
	Error	765.8	35	21.9				

An analysis of covariance (ANCOVA) was conducted to determine if the differences noted between the experimental and control groups were of statistical significance. **Table 4** reveals that, after accounting for pre-test scores, the mean scores for test anxiety and mathematical self-concept in the experimental group were significantly different in the post-test phase. This suggests that cognitive-behavioral instruction was effective in diminishing test anxiety and enhancing mathematical self-concept among the students. To be precise, cognitive-behavioral therapy was responsible for a 21% decrease in anxiety levels and an 11% improvement in mathematical self-concept.

The current study sought to determine the efficacy of cognitive-behavioral instruction in reducing math anxiety and enhancing mathematical self-concept in students with specific learning difficulties in mathematics. The results indicate that cognitive-behavioral therapy had a substantial effect on the students' scholastic achievement, resulting in a broad enhancement. This therapy led to an elevation in the students' confidence in their mathematical abilities and a decrease in their anxiety related to math. Specifically, the average math anxiety score in the experimental group started at 25.3 in the pre-test and diminished to 16.8 in the post-test, marking a significant decrease from the initial level. Regarding self-concept, the average score for the experimental group began at 21.4 in the pre-test and rose to 25.4 in the post-test, reflecting an advancement over the pre-test level. Furthermore, the Shapiro-Wilk test was utilized to evaluate the normality of the score distributions in the post-test phase for both the experimental and control groups, with the findings revealing that the distributions of the scores for the variables adhered to a normal distribution (P < 0.001).

The outcomes of the current study align with the conclusions drawn by Franklin *et al*. (2008), Libor *et al*. (2008), and Spence *et al*. (2006) [28-30]. Franklin *et al*. (2008) utilized a cognitive-behavioral group counseling method to tackle behavioral challenges among students within a school environment over the course of seven sessions [28], leading to observed enhancements in both internal and external issues for the experimental group. Libor *et al*. (2008) executed a comparative analysis of cognitive-behavioral therapy provided in both group and individual settings for children between the ages of 3 and 12 [29]. Their findings implied that children could derive benefits from either individual or group cognitive-behavioral therapy, with the selection of the format contingent upon practical factors such as therapeutic resources, client volume, and the inclinations of the children and their guardians. Spence *et al*. (2006) implemented an experimental framework to evaluate the efficacy of cognitive-behavioral training for parents delivered through the Internet [30]. The statistical evaluation disclosed that internet-facilitated parent training exerted a substantial influence on diminishing children's anxiety levels, a finding that concurs with the results of the current study.

In their study, Vagg and Papasdorf illustrated the effectiveness of cognitive therapy and systematic desensitization in the treatment of test anxiety disorder. They found that systematic desensitization and biofeedback diminish the aspect of emotional reactivity, whereas cognitive therapy markedly reduces worry [31]. Furthermore, Barlow *et al*. (1984) demonstrated through their research that individuals suffering from generalized anxiety and phobia disorders who undergo cognitive therapy in conjunction with relaxation techniques and electromyographic biofeedback achieve a higher and more pronounced level of improvement when compared to individuals in the control group [32].

Kucian *et al*. (2011) conducted a study to explore the brain regions that become active in response to the non-symbolic distance effect in children [33], comparing those with and without mathematical disabilities. They discovered that children without such disabilities activate specific brain areas when selecting responses. However, these children frequently struggle to implement learning strategies independently due to challenges with executive functions, including self-regulation, self-talk, and working memory, necessitating guided instruction. Askenazi and Henik (2010) further highlighted that individuals with mathematical disabilities exhibit impairments in executive functions [34], attentional networks, and processing speed. Considering the cognitive processing challenges encountered by children with mathematical disabilities—such as difficulties in recalling information, navigating between mathematical charts and diagrams, grasping number concepts, and performing calculations—it is evident that they require structured, curriculum-based direct instruction to master fundamental mathematical cognitive skills. Consequently, the integration of brain-based learning theories is essential in this educational context.

Pajares (1996) demonstrated that an individual's assessment of their capability to solve mathematical problems is indicative of their actual problem-solving ability and can mitigate the impact of other influencing factors [35], such as math anxiety. This self-efficacy in mathematics can be a predictor of overall cognitive proficiency, including mathematical problem-solving skills. Martin and Debus's study (1998) suggests that a robust sense of mathematical self-concept and academic self-concept contributes to enhanced motivation and achievement in mathematics [36]. Rajabi and Shahni Yilag (2014), referencing Peterson *et al*., posit that attribution styles encompass both positive and negative events [37], each characterized by three dimensions: internal versus external attribution, stable versus unstable attribution, and global versus specific attribution. The internal-external dimension pertains to attributing success or failure to personal traits or external circumstances, while the stable-unstable dimension relates to attributing outcomes to enduring or transient factors.

Weiner (1985) further illustrated that global attribution involves ascribing success or failure to universal circumstances, while specific attribution relates to assigning causality to particular instances [38]. Yung (2004) investigated attribution patterns, self-perception, and depressive symptoms among 9 to 11-year-old children with learning disabilities in Hong Kong [39]. The findings revealed that these children tend to attribute negative occurrences to internal, pervasive, and enduring factors, display a diminished sense of self, encounter elevated levels of stress and anxiety, and exhibit increased depressive symptoms following stressful episodes.

Cognitive-behavioral therapy, therefore, exerts a comprehensive influence on psychological and cognitive elements. This therapeutic approach is designed to modify individuals' convictions and cognitive processes, ultimately transforming their emotional responses and actions. Drawing from the aforementioned research outcomes, it can be surmised that cognitive-behavioral therapy is more efficacious than pharmacological interventions and alternative treatments, providing a more economical and effective solution.

The findings suggest that cognitive-behavioral instructional techniques should be broadly incorporated into educational programs. Researchers are likewise advised to investigate the efficacy of these strategies on

various learning frameworks, given their positive effects on students with specific learning challenges. Such interventions may contribute to the enhancement and correction of these issues during the formative years of childhood and early education.

The current study encountered certain limitations. The cross-sectional nature of the research restricted the establishment of causal links among the variables under study. Furthermore, the reliance on self-report measures and the concentration on pupils with specific learning disabilities, especially in mathematics, at Shariati 2 Special School in Shahrekord, presented difficulties due to restricted access and the lack of a follow-up phase, attributed to time limitations. Consequently, the extrapolation of the findings should be undertaken with caution.

To mitigate these limitations in subsequent research endeavors, it is proposed that investigations be expanded to include diverse populations, encompassing both male and female students, and to cover a range of disabilities across different urban centers, with the inclusion of follow-up intervals in the study design.

Conclusion

The results of the present study indicate that a series of twelve cognitive-behavioral counseling sessions can effectively diminish anxiety and bolster students' self-concept in mathematics. Consequently, it is advised to implement these sessions to enhance students' mathematical performance. This advice is underscored by the importance of adhering to the specific traits of the research participants and the established criteria for their selection and exclusion.

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Conflict of interest: None

Financial support: None

Ethics statement: This research originates from a master's thesis submitted to the University of Science and Arts of Yazd. During this study, ethical guidelines were adhered to, including informing participants of the research goals, securing their informed consent for session participation, preserving the confidentiality of their information, and maintaining privacy.

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