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The Effectiveness of Play Therapy Based on Cognitive-Behavioral Approach on Attributional Styles and Academic Enthusiasm in Children with Math Disabilities

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ABSTRACT

Objective: The present investigation was undertaken with the objective of assessing the efficacy of game therapy grounded in a cognitive-behavioral framework concerning attributional styles and academic enthusiasm among students exhibiting mathematical disabilities.

Methods: The methodological approach employed in this study was semi-experimental, utilizing a pre-test and post-test design that encompassed two groups: an experimental group and a control group. The statistical population comprised all male elementary school students diagnosed with mathematical deficiencies who sought evaluation at the assessment, education, and developmental-educational rehabilitation center in Kish during 2024 year. From this population, 30 students were randomly selected and allocated into two groups, namely the experimental group (15 participants) and the control group (15 participants). Data collection was facilitated through the administration of an attributional style questionnaire and an academic enthusiasm questionnaire. The implementation of play therapy rooted in the cognitive-behavioral approach was conducted with the experimental group, while the control group received no intervention.

Results: The acquired data were subjected to analysis utilizing the multivariate covariance test. The findings indicated that intervention had a statistically significant impact on enhancing the overall score of academic enthusiasm, augmenting the total score of optimistic attribution style, and reducing the total score of pessimistic attribution style. Furthermore, the results revealed that the intervention significantly influenced the improvement of the behavioral, emotional, and cognitive components of enthusiasm.

Conclusions: In light of the findings, it can be inferred that professionals and planners within the domain of psychological health may advance efforts to mitigate learning disorders and empower students through the implementation of targeted intervention programs.

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Introduction

Dyscalculia is one of the most common learning disorders among children in the field of academic learning and life skills training, which impairs their ability to learn numerical concepts, perform accurate mathematical calculations, problem-solve and other mathematical skills. (Sarvarian et al., 2023)Mathematical disability, classified as one of the categories of specific learning disabilities, pertains to instances where an individual's proficiency in mathematical computations is markedly inferior to what is anticipated based on their chronological age, intelligence quotient (IQ), and the educational experiences they have been afforded (Simó, 2022). This type of disorder continuously causes academic failure in the affected students and makes them more vulnerable to behavioral and socio-emotional difficulties (Wieczorek et al., 2024). The adverse ramifications of mathematical disability during early childhood may have enduring impacts on both personal and social dimensions throughout adulthood, and a substantial number of children exhibiting mathematical disabilities concurrently experience significant challenges in various psychological functions (Alipanah et al., 2022). Despite the fact that children exhibiting mathematical disabilities are explicitly categorized as learning disabilities, those encountering challenges stemming from such disabilities are seldom referred to specialized centers for assessment, and as a result, they are frequently overlooked, potentially exacerbating their difficulties (Nieminen et al., 2023). In this context, one psychological factor that may safeguard students with mathematical disabilities against heightened vulnerability is their attributional styles (Rostamoghli et al., 2015).

Attributional style refers to the methods for explaining the causes of successes and failures. According to Heider (2013), people have two main types of attributions, or behavior interpretations: internal or external. In the internal attribution, behavior is referred to individual characteristics and internal, stable, and general cause, while in the external attribution, behavior is referred to environmental and social pressures and external, unstable, and specific causes. Individuals who explain bad events based on the internal, stable and general causes, have a pessimistic explanation style. Conversely, individuals who explain them based on external, unstable and specific causes have an optimistic attribution style (Seligman, 1995). In students with learning disorders, these styles may be negative and ineffective.

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These styles, functioning as cognitive and motivational determinants, exert influence over various facets of students' lives, thereby shaping the degree of their learning, the outcomes of their academic endeavors, and their trajectories of academic advancement or regression (Gordeeva et al., 2020). When students persist in employing negative attributional styles, they are unable to accurately interpret academic circumstances, leading to numerous challenges, including subpar academic performance and overall academic decline (Scaini et al., 2020). Students with learning disabilities tend to internalize their negative experiences at school. This makes them doubt their ability for successful interaction with others and change their attributional styles (Sadri Demirchi, et al., 2020). Cognitive-behavioral play therapy improves their attributional styles by focusing on changing these negative thought patterns.

Conversely, an examination of literature pertaining to learning disorders indicates that students with mathematical deficiencies typically exhibit inadequate academic performance, coupled with diminished academic engagement and enthusiasm, which are recognized as consequences of their learning disabilities (Shcheglova, 2018). Academic engagement, understood as an individual's sense of belonging and propensity to participate actively within the educational milieu, serves as a fundamental component of effective education and learning (Jung & Ryu, 2023). Students demonstrating academic engagement exhibit heightened focus on learning subjects, greater adherence to school regulations, a reduction in non-compliant behaviors, and superior performance on assessments (Ahmadpour et al., 2021).

In this context, the results of the investigation conducted by Syamsi and Dharma (2023) revealed that students with learning disabilities exhibited diminished levels of academic engagement in comparison to their typically developing peers. Owen (2023), in his research titled "The Effect of School-Based Group Adlerian Play Therapy on Internalizing Behaviors and Academic Achievement," derived the conclusion that play therapy, particularly when applied in a group framework, facilitates a more profound engagement with the child's inner psychological landscape, concurrently serving as an efficacious strategy for ameliorating internalized behaviors and augmenting academic performance. Darvishi Chaleshtari and Ghazanfari (2023), in their study entitled "The Effectiveness of Cognitive-Behavioral Play Therapy on Bullying, Separation Anxiety, and Academic Enthusiasm of First Grade Female Elementary School Students in Shahrekord," asserted that this therapeutic modality has led to a reduction in bullying tendencies and separation anxiety while simultaneously fostering an increase in the academic enthusiasm of the students involved. Goudarzi and Yousefi Digesara (2018) demonstrated that cognitive-behavioral play therapy has a

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significant role in reducing the fear of negative evaluation and increasing academic optimism in students.

In light of the ramifications associated with mathematical underachievement, it is imperative that educational and therapeutic interventions are implemented to mitigate or eradicate such disorders; failure to do so may result in the persistence of these challenges into adulthood, thereby exacerbating their prevalence and imposing significant burdens on societal resources (Karami & Lorestani, 2022). In this vein, educational specialists advocate that to effectively instruct children, it is essential to engage with their world of childhood through play; consequently, play has been increasingly recognized over the past few decades as a viable therapeutic approach for addressing a variety of learning disorders (Alipanah et al., 2022). Cognitive-behavioral play therapy represents a structured play methodology that enables the establishment of precise and explicit therapeutic objectives while forecasting specific strategies for the attainment of these goals (Soroushvala et al., 2023). A notable advantage of cognitive-behavioral play therapy, in contrast to alternative forms of play therapy, lies in its explicitly defined therapeutic aims and methodologies, thus facilitating the application of clear therapeutic objectives and anticipating targeted approaches for their realization (Egbe et al., 2023).

Learning disorders and their concomitant academic difficulties contribute to a decrease in self-esteem, foster social isolation, and exacerbate behavioral issues among children, thereby jeopardizing their mental health (Yazdani, 2022). The ramifications of these issues extend from the educational environment to the familial context, propagating anxiety and discontent within the domestic setting and inflicting considerable damage upon the mental well-being of the individual, family, and society as a whole.

With respect to the adverse effects of dyscalculia and its widespread consequences on the personal, academic, and social life of these students, as well as the potential irreversible damage, timely identification, diagnosis, and treatment of this disorder is of extreme importance, since it's the major cause of severe academic learning difficulties.

Researchers and professionals in the field of specific learning disorders have designed and applied various therapeutic methods in experimental or quasi-experimental studies to assist individuals with this kind of disorder and address their educational and academic difficulties. The interventions and educational or therapeutic methods used to treat and improve specific learning

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disorders were somehow effective. However, in some cases, they weren't effective and revealed inconsistent results. In such circumstances, focusing on educational-therapeutic programs specifically designed for the target population of children can lead to more beneficial and reliable outcomes. Hence, with respect to the evident research gap and the importance of addressing the problems of students with dyscalculia, the present study was performed with the purpose of examining the effectiveness of cognitive-behavioral play therapy on attributional styles and academic engagement in children with dyscalculia.

Material and Methods

The methodology employed in this investigation is characterized as a semi-experimental framework utilizing a pre-test-post-test design alongside a control group. Following the identification of participants and their subsequent random allocation into experimental and control cohorts, play therapy grounded in a cognitive-behavioral paradigm was administered in a group context over a span of ten sessions, with one session conducted weekly for the subjects within the experimental group. Upon the conclusion of these sessions, a post-test was administered to individuals in both groups. The statistical population for the present inquiry encompassed all students who sought services at the Comprehensive Center for Assessment, Education, Rehabilitation, and Early Developmental Intervention (Kish Comprehensive Center) located in Kish City in 2023, all of whom had received a definitive diagnosis of mathematical deficiency from the center's specialists and possessed a formal record within the aforementioned institution.

Utilizing a purposive and voluntary sampling approach, and in light of the quasi-experimental nature of the study, thirty elementary school students with a confirmed diagnosis of mathematical disability were selected after fulfilling the specified inclusion criteria and were randomly assigned to two groups, namely experimental and control, each comprising 15 participants.

The present research was performed according to ethical standards in line with the principles of human research. Participation was entirely voluntary and based on informed consent. Written consent was obtained from the students and their parents or legal caretakers. Students had the right to withdraw at any stage of the research. All personal and research-related data were kept confidential and used solely for the purposes of the research. Additionally, it was ensured that the research instruments and methods have no psychological, emotional, or physical harm to the

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participants. The study was performed under the supervision of the university's ethics committee and complied with all applicable ethical standards.

Parents' consent to their children's presence in play therapy sessions, children's willingness and consent to participate in the study, completion of research instruments, education in primary school at the time of the study, definitive diagnosis of dyscalculia by the center's specialist, children's good physical health, the absence of visual or hearing impairments, and the ability to attend all sessions in the play therapy program were the inclusion criteria in the present research. Also, exclusion criteria included incomplete research instruments; diagnosis of other neurodevelopmental disorders, such as attention-deficit/hyperactivity disorder (ADHD); family issues, such as divorce or parental addiction; absence in more than one session of the play therapy program; receiving psychological services from other centers during the study or within the previous 6 months; and failure to complete any part of the pre-test or post-test.

Attribution Styles Questionnaire: The Attribution Styles Questionnaire was conceived and formulated by Peterson et al. (1982) with the objective of ascertaining and quantifying individuals' attribution styles and operates as a self-report instrument encompassing 12 hypothetical scenarios (six positive and six negative). Each scenario comprises four inquiries, necessitating that the participant envisages themselves in the respective situation to respond accurately to the items. The measurement scale of the questionnaire is structured upon a Likert scale ranging from 1 to 7. The scores for negative and positive incidents are computed separately as positive and negative attributions. The internal consistency coefficients for the three scales of the questionnaire have been reported to range between 0.83 and 0.90, and the three-factor structure of the questionnaire (internal/external, stable/unstable, and general/specific) has demonstrated favorable alignment with the data concerning both positive and negative scenarios. In a study in Iran, the reliability of the questionnaire yielded a Cronbach's alpha coefficient of 0.89 for positive attributions and 0.87 for negative attributions (Ansarisadr & Shirazi, 2022). In the current study, reliability was established with a Cronbach's alpha of 0.81.

Academic Enthusiasm scale: This questionnaire was constructed by Fredricks et al. (2011) and consists of 15 items designed to evaluate three distinct subscales: behavioral, emotional, and cognitive enthusiasm among students. Items 1 through 4 pertain to the behavioral enthusiasm subscale, items 5 through 10 relate to the emotional enthusiasm subscale, and items 11 through 15

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correspond to the cognitive enthusiasm subscale. The responses to each item are quantified on a scale from 1 to 5, denoting a continuum from never to always. The lowest attainable score is 15, whereas the highest possible score is 75. A score that falls within the range of 15 to 25 signifies low academic enthusiasm, a score that is situated between 26 and 50 reflects moderate academic enthusiasm, and a score that exceeds 50 denotes high academic enthusiasm. Fredricks et al. (2011) have established the reliability coefficient of this scale at 0.86. The face validity of the instrument has been corroborated by a multitude of experts within this domain. In a study in Iran, the overall reliability of the instrument was determined with a Cronbach's alpha coefficient of 0.80, while the subscales pertaining to cognitive, emotional, and behavioral enthusiasm yielded Cronbach's alpha values of 0.81, 0.78, and 0.79, respectively (Mollahoseini et al., 2022). The reliability observed in the current study was recorded at a Cronbach's alpha of 0.78.

The overarching framework for the group play therapy sessions was devised with due consideration to the cognitive limitations exhibited by LD students.

Table 1. Overview of play therapy phases employing cognitive-behavioral method

Session	Content
1	Getting to know the therapist and the children, specifying the goals of the sessions, and the activities of the play therapy sessions, conducting a pre-test
2	Identifying children's behavioral, physical, and cognitive problems, providing techniques to increase accuracy and focus with practical practice
3	Training and strengthening social skills, creating a space for cooperation and assistance in children, strengthening the important role and position of individuals in group activities, and practical practice of these skills
4	Training and strengthening verbal and non-verbal skills such as listening and how to talk correctly, and providing practical practice
5	Increasing self-awareness skills in order to strengthen the recognition of one's own abilities and increase self-confidence, and providing practical practice
6	Identifying and strengthening the child's abilities and strengths with the aim of strengthening the child's sense of worth, practical practice of changing negative thoughts and replacing them with positive thoughts, using the ABC technique to change these thoughts
7	Helping the child identify negative emotions and express emotional experiences correctly, and teaching self-regulation skills to identify and record different emotions in a weekly program by providing practical practice
8	Managing emotions and reducing anxiety by reviewing the child's emotional experiences throughout the week and examining symptoms and causes of emotion, using the ABC cognitive methodology to identify false beliefs, using positive self-talk
9	Increasing skills in dealing with negative emotions, strengthening problem-solving and decision-making skills by providing practical exercises
10	Overview of the techniques and skills learned and providing feedback and planning for their practical use in everyday life, conducting a post-test

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Results

Students diagnosed with mathematical disabilities were involved in the research, which comprised two groups: experimental and control, each consisting of 15 participants. The mean age of individuals in the experimental cohort was 10.80 years, while the mean age of individuals in the control cohort was 10.86 years. In the experimental cohort, 54 percent (8 participants) were classified as fourth graders, 26 percent (4 participants) as sixth graders, and 20 percent (3 participants) as fifth graders; conversely, in the control cohort, 40 percent (6 participants) were in fourth grade, 40 percent (6 participants) in fifth grade, and 20 percent (3 participants) in sixth grade.

Table 2. Mean and standard deviation of the scores of the research variables by group and measurement stages

Dependent variable	Group	N	Pretest	Posttest
			SD ± Mean	SD ± Mean
Pessimistic attribution style	Experimental	15	15.40 ± 2.22	13.6± 1.70
	Control	15	14.92± 2.54	15.2± 2.17
Optimistic attribution style	Experimental	15	11.60± 2.26	14.33± 2.19
	Control	15	11.75± 2.37	11.56± 1.99
Behavioral component- Enthusiasm	Experimental	15	12.26± 3.05	15.66± 2.31
	Control	15	12.80± 2.90	12.20± 2.67
Emotional component- Enthusiasm	Experimental	15	14.65± 2.24	17.97± 1.86
	Control	15	15.10± 3.15	14.80± 3.12
Cognitive component- Enthusiasm	Experimental	15	14.60± 2.72	18.40± 2.82
	Control	15	14.93±2.76	14.40±2.32
Academic Enthusiasm -total score	Experimental	15	41.51± 8.01	52.03± 6.99
	Control	15	42.83± 8.81	41.40± 8.20

The data presented in Table 2 indicates that the participants who engaged in the cognitive-behavioral play therapy program exhibited higher mean scores in the dependent variables during the post-test phase in comparison to the pre-test phase; however, no noteworthy alterations were detected in the scores of individuals within the control group.

Table 3. Results of the Shapiro-Wilk test, skewness and kurtosis to examine the normality of the data distribution

Dependent variable	Phase	Normality indices			
		F value	P	Skewness	Kurtosis
Pessimistic attribution style	Pretest	0.899	0.208	-0.83	-0.19
	Posttest	0.955	0.224	-0.13	-0.76
Optimistic attribution style	Pretest	0.745	0.511	1.64	1.99
	Posttest	0.909	0.094	0.377	-1.06
Behavioral component- Enthusiasm	Pretest	0.932	0.056	0.46	-0.83
	Posttest	0.909	0.073	0.044	-1.36

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Emotional component- Enthusiasm	Pretest	0.888	0.315	0.97	0.21
	Posttest	0.967	0.463	0.034	-0.76
Cognitive component- Enthusiasm	Pretest	0.961	0.331	-0.151	-0.66
	Posttest	0.965	0.407	0.27	-0.05
Academic Enthusiasm -total score	Pretest	0.978	0.216	1.02	1.10
	Posttest	0.946	0.334	0.110	-1.39

The findings derived from the Shapiro-Wilk test reveal that the significance level for all dependent variables exceeds 0.05 (P>0.05), thereby confirming the normal distribution of scores. Moreover, the skewness and kurtosis values for the research variables fall within the range of (-2 to +2), indicating that the distribution of these variables possesses normal skewness and kurtosis. Consequently, the application of analysis of covariance is deemed appropriate for the research data.

Table 4. Results of Levene test for equality of variances

Dependent variable	Phase	Equality of variances			
		F value	DF1	DF2	P
Pessimistic attribution style	Pretest	1.29	1	28	0.33
	Posttest	1.58	1	28	0.18
Optimistic attribution style	Pretest	2.16	1	28	0.17
	Posttest	0.41	1	28	0.20
Behavioral component- Enthusiasm	Pretest	2.90	1	28	0.71
	Posttest	2.07	1	28	0.16
Emotional component- Enthusiasm	Pretest	1.35	1	28	0.27
	Posttest	3.67	1	28	0.16
Cognitive component- Enthusiasm	Pretest	2.50	1	28	0.12
	Posttest	1.90	1	28	0.33
Academic Enthusiasm -total score	Pretest	3.56	1	28	0.21
	Posttest	2.19	1	28	0.40

In the present investigation, prior to conducting covariance analysis, Levene test was employed to assess the assumption of equal variances. The results illustrated in Table 4 affirm Levene assumption across all dependent variables in the study. Given the random allocation of participants to the two groups and the adequacy of sample size, analysis of covariance was subsequently utilized for hypothesis testing.

Table 5. Results of multivariate analysis of covariance (MANCOVA)

Test	Value	F	P	Eta	power
Pillai's trace	0.863	48.19	0.001	0.863	1
Wilks' Lambda	0.137	48.19	0.001	0.863	1
Hotelling's Trace	6.286	48.19	0.001	0.863	1
Roy's largest root	6.286	48.19	0.001	0.863	1

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Based on the findings presented in Table 5, the Wilks Lambda statistic (F=194.48 and P=0.001) indicates a significant effect. According to the outcomes of the research, a significant difference exists between the participants in the experimental group and those in the control group concerning the post-test results of the dependent variables (attributional style scores and academic enthusiasm) in relation to the pre-test control group. Consequently, it can be inferred that a substantial difference has emerged in at least one of the aforementioned dependent variables, and the effect size indicates that 86.3% of the variance observed between the two groups can be attributed to the intervention (cognitive-behavioral play therapy program). In the subsequent analysis, the objective was to determine whether the dependent variables under investigation (attributional style scores and academic enthusiasm) are individually influenced by the independent variable (cognitive-behavioral play therapy program). To this end, the univariate analysis of covariance (ANCOVA) was employed, with the results displayed in Table 6.

Table 6. Between-subject effects of analysis of covariance in post-test of dependent variables

Dependent variable	SS	DF	F	P	Eta	Power
Pessimistic attribution style	43.85	1	33.67	0.001	0.574	1
Optimistic attribution style	60.61	1	20.60	0.001	0.452	0.992
Academic Enthusiasm	945.65	1	108.78	0.001	0.513	0.996

According to the results delineated in Table 6, the cognitive-behavioral play therapy program (while controlling for the impact of the pre-test as a covariate on the post-test) demonstrates a significant influence on enhancing the academic enthusiasm score (F=677.33, P=0.001, η=0.574), the optimistic attribution style score (F=605.20, P=0.001, η=0.452), and diminishing the pessimistic attribution style score (F=784.108, P=0.001, η=0.513), thereby substantiating the research hypothesis.

Discussion

The objective of the current investigation was to assess the efficacy of play therapy employing a cognitive-behavioral framework on attributional styles and academic enthusiasm among students experiencing difficulties in mathematics. The findings of the research revealed a significant enhancement in the scores of academic enthusiasm and internal attributional style within the experimental cohort. Consequently, the principal hypothesis of the current investigation is

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substantiated. This outcome aligns with the findings of the studies conducted by Owen (2023), Kumar et al. (2022), Scaini et al. (2020) and Darvishi Chaleshtari and Ghazanfari (2023).

Regarding the effects of these intervention methods on attributional styles, no similar studies were found to compare their results with the present study. However, indirectly, the results are in line with the findings of several previous studies, such as Oven (2023), Kumar et al. (2022), Eskene et al. (2022), and Masangah & Periman (2021). Consistent with the findings of the present research, Oven (2023) reported that school-based group Adlerian play therapy had a positive and significant effect on internalizing behaviors and academic achievement of students. Also, similar to the current study, Kumar et al. (2022) and Masangah & Periman (2021) performed independent studies and demonstrated that play therapy interventions were effective in reducing behavioral problems and improving the psychological and general well-being of participants. However, recent studies about positive psychology indicate that one of the relevant factors influencing psychological and behavioral well-being across various populations is attributional style (Alkafi et al., 2023).

With respect to the result that cognitive-behavioral play therapy improves students' attributional style scores, it can be explained that children with mathematical difficulties gain greater awareness and insight into their behaviors and thoughts by play therapy. They learn strategies that enable them to overcome many of their problems. Since children with dyscalculia often experience negative emotions in the classroom and school environments, they are more reluctant to begin the social interaction. Also, they fear situations in which their mathematical performance might be evaluated, which leads to issues such as low self-confidence, academic anxiety, and other negative academic emotions. These experiences can reinforce a negative attributional style, which in turn worsens their academic difficulties in mathematics. As a result, play therapy sessions must include techniques that correct children's cognition, thinking, and behavior; educate them on the proper attribution for the results of their actions to effort, perseverance, and personal skills; and also teach them to engage in appropriate behavior based on the situation. Since cognitive-behavioral play therapy attends to these kinds of issues and provides autonomy and more opportunities for cognitive and behavioral learning, it helps students develop an internal locus of control, improved attention, and greater responsibility for their learning outcomes.

The research results demonstrated that cognitive-behavioral play therapy increases the average score of academic engagement in the post-test phase for students in the experimental group. The

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present results are consistent with previous studies, such as Robinson (2023), who found the positive and significant effect of play therapy on children's emotional, behavioral, social, and academic functioning, Parker et al. (2022), who showed the positive effects of play therapy in schools on improving students' cognitive and emotional skills, Blanco et al. (2019), who reported the impact of child-based play therapy on academic progress and enthusiasm, Hosseini Zaringol et al. (2022), who found that play therapy was effective in addressing math learning problems in elementary students, and Esmail Zadeh (2022), who highlighted its effectiveness in improving academic performance in students with reading disorders.

The findings showed that cognitive-behavioral play therapy improves academic enthusiasm scores by enhancing students' motivation and encouraging them to complete tasks. In this method, therapists categorize their aims based on self-growth, maturity, and relationship development.

In terms of self-growth, children express their emotions and thoughts, explore their interests, and gain a sense of control over their environment while playing. Likewise, in the present study, playing with others and with diverse toys enhances children's cognitive, emotional, and social skills and increases their ability to cooperate and empathize with others, so that ultimately improves their self-esteem and confidence. Furthermore, self-esteem and self-confidence significantly influence the internal-external dimension of attributional style. An individual with strong positive self-esteem is less likely to attribute failure to internal causes, and vice versa. In this regard, it can be concluded that play therapy, by enhancing cognitive, behavioral, and emotional skills, not only provides children with opportunities for practicing new skills and learning how to face challenges by observational learning, but also offers a safe environment, free of judgment or punishment, in which the children realize that their thoughts, feelings, and behaviors significantly influence academic outcomes. In this way, if the child attempts more, he/she learns to get a desirable result, acknowledges that failure is not permanent and can have an active role in shaping their environment and its outcomes.

It is also noted that since emotional academic engagement includes internal interest in school courses and assignments, valuing and attaching importance to them, the presence of positive emotions, and the absence of negative emotions such as hopelessness, anger, and anxiety during schoolwork and learning, cognitive-behavioral play therapy—which includes emotional education as part of its treatment protocol—can affect the emotional engagement. The emotional training

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component of the cognitive-behavioral therapy protocol often involves programs designed to help children identify and differentiate between basic emotions such as anger, anxiety, or sadness. These programs often focus on recognizing the physiological changes associated with these emotions to increase awareness of one's emotional states. In this protocol, the thought-monitoring exercises during play can reduce tension and anxiety related to math tasks and address automatic beliefs regarding the child's perceived ability to successfully do the assignments. With respect to the fact that cognitive-behavioral play therapy can also significantly contribute to the development of self-esteem and self-efficacy in students, these skills, while reducing the negative emotions, can also lead to increased academic performance and, consequently, greater academic interest and engagement in the students.

In elucidating this result, one may assert that a student encountering difficulty in mathematics, as a consequence of negative emotional experiences within the classroom and school context, is confronted with an enduring sense of apprehension regarding any scenario wherein their mathematical performance may be evaluated, thereby fostering the development of a detrimental attributional style in the individual. Cognitive-behavioral play therapy has the potential to be instrumental in enhancing cognitive competencies and ameliorating attributional styles and locus of control by focusing on the interests and motivations of children regarding their educational pursuits.

Based on the findings obtained, it is recommended that educational teams and specialized working groups conduct screenings of children experiencing mathematical learning difficulties and implement play therapy interventions aimed at alleviating the academic challenges faced by this demographic, alongside the incorporation of requisite exercises and instructional strategies. It is further recommended that the contents of the educational program be disseminated to children and their families through workshops, literature, or informational pamphlets. Additionally, it is advised that professionals within this domain, by organizing workshops for children and their guardians, facilitate the execution of diverse therapeutic scenarios conducted in a playful manner for their clients. In this study, the sample group included elementary students (boys) diagnosed with dyscalculia referred to the Assessment, Education, and Developmental-Educational Rehabilitation Center in Kish Island, Iran. Therefore, caution is necessary when generalizing the results to other student groups or educational levels.

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Researchers often encounter constraints in their investigations, and this study was no exception: Among the constraints identified in the present study is that the sample population, consisting of elementary school students, was characterized by a learning disability in mathematics, necessitating caution when extrapolating the findings to other student populations and educational tiers. Furthermore, due to limitations in the selection criteria for participants in the study, the sample was derived utilizing a convenient and purposeful sampling approach. Another constraint of the current study is the absence of a prolonged follow-up duration owing to challenges in accessing the sample subjects.

It is also recommended for future researchers that, in light of the effectiveness of cognitive-behavioral play therapy on the attributional styles and academic enthusiasm of students with mathematical deficiencies, these services be integrated and implemented within existing educational institutions nationwide, particularly in educational settings. The influence of gender as a moderating variable in the analysis of the impact of cognitive-behavioral play therapy on academic enthusiasm and attributional styles across various educational levels and among students with specific learning disabilities warrants further investigation and examination. Lastly, it is proposed that both short-term and long-term follow-up periods be incorporated in subsequent studies to facilitate a more precise evaluation of the sustained efficacy of this therapeutic approach over time.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the ethics committee of Payam e Noor University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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