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Comparison of the Effects of Self-Determination-Based Positive Feedback and Mindfulness Training on Depression, Concentration, and Attention in Children Aged 7–12 Years

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A B S T R A C T

Purpose: This study aimed to compare the effectiveness of mindfulness training and self-determination-based positive feedback in reducing depression and improving concentration and attention among children aged 7–12 years.

Methods and Materials: This quasi-experimental study employed a pretest–posttest design with a three-month follow-up and a control group. The statistical population consisted of children aged 7–12 years in Amol, Iran. Participants were selected through purposive sampling and randomly assigned to mindfulness training, self-determination-based positive feedback, and control groups. The intervention groups received the corresponding training programs, whereas the control group received no intervention during the study period. Data were collected using the Children's Depression Inventory (CDI) and the Conners Teacher Rating Scale. Repeated-measures analysis of variance was used to examine changes across measurement occasions and differences among groups, followed by Bonferroni post-hoc comparisons.

Findings: Repeated-measures analysis of variance demonstrated significant differences among the three groups across time in depression, concentration, and attention ($p < .0001$). Mindfulness training produced a significantly greater reduction in depression scores and significantly greater improvements in concentration and attention compared with both self-determination-based positive feedback and the control condition. Positive feedback also significantly improved concentration and attention relative to the control group; however, its effect on depression did not differ significantly from that of the control group. The time × group interaction was significant for all outcome variables, indicating differential patterns of change across the three conditions. Follow-up comparisons further showed that the beneficial effects of mindfulness training were maintained at the three-month assessment.

Conclusion: Mindfulness training appears to exert broader and more persistent effects than self-determination-based positive feedback because it simultaneously improves affective and cognitive outcomes. Accordingly, mindfulness-based interventions may constitute an effective approach for reducing depressive symptoms and strengthening concentration and attention in children aged 7–12 years.

Keywords: *Mindfulness, Positive Feedback, Self-Determination, Depression, Concentration, Attention*

1. Introduction

Childhood is a critical developmental period during which emotional regulation, cognitive control, attentional capacity, and motivational processes undergo rapid transformation. Difficulties that emerge during this period may interfere not only with children's current psychological well-being but also with their academic performance, interpersonal relationships, self-concept, and subsequent developmental adjustment. Among the problems that can substantially compromise functioning in school-aged children, depressive symptoms and deficits in concentration and attention are particularly important because they influence both affective and cognitive dimensions of everyday life. Depression in childhood may manifest through persistent sadness, diminished pleasure, irritability, feelings of worthlessness, reduced motivation, social withdrawal, and difficulty engaging effectively in educational activities. At the same time, concentration and attention are fundamental executive capacities that enable children to select relevant stimuli, sustain goal-directed mental effort, inhibit distractions, and complete academic and social tasks successfully. When depressive symptoms coexist with poor attentional regulation, children may experience a mutually reinforcing cycle in which negative mood diminishes engagement and cognitive efficiency, while repeated academic or behavioral difficulties further weaken perceived competence and emotional well-being (Hajizadeh Anari & Miri, 2025; Tabatabaei Nejad et al., 2018).

Contemporary psychological interventions increasingly emphasize approaches that simultaneously strengthen emotional regulation and cognitive functioning rather than addressing symptoms in isolation. Mindfulness-based interventions have consequently received considerable attention because mindfulness involves purposeful and nonjudgmental awareness of present-moment experiences, including thoughts, emotions, bodily sensations, and environmental stimuli. From a regulatory perspective, mindfulness may help individuals disengage from habitual or maladaptive responses and respond to internal and external experiences with greater awareness and flexibility. Psychological flexibility and mindfulness have been associated with more adaptive individual outcomes, suggesting that mindful awareness may facilitate deliberate regulation rather than automatic responding under stressful or emotionally demanding conditions (Ramaci et al., 2019). More recent theoretical formulations similarly conceptualize mindfulness as a mechanism capable of influencing multiple stages of emotion regulation, including attentional deployment, appraisal, and response modulation, thereby providing a plausible framework through which mindfulness could affect both depressive symptoms and cognitive functioning (Raugh & Strauss, 2024).

One important mechanism underlying mindfulness training is the systematic regulation of attention. Mindfulness exercises commonly require individuals to direct attention toward a selected object, recognize episodes of distraction, and intentionally return attention to the intended focus. Repeated practice may therefore strengthen the capacity to sustain attention while decreasing automatic engagement with irrelevant stimuli. This mechanism is especially relevant in childhood because attentional control is closely linked to classroom participation, learning, task completion, behavioral regulation, and academic achievement. Evidence increasingly supports the applicability of mindfulness to attentional outcomes. Short mindfulness exercises have been associated with reductions in test anxiety and improvements in concentration among secondary school students, indicating that even relatively brief mindfulness practices may influence cognitive engagement in educational settings (Ahmadvand et al., 2024). Likewise, mindfulness has been examined in relation to concentration during reading comprehension, with findings suggesting that mindfulness-oriented practices can facilitate sustained cognitive involvement in demanding learning activities (Gallardo & Luna, 2024). These observations are consistent with the proposition that mindfulness is not limited to emotional symptom management but may contribute directly to the development of attentional efficiency.

Recent evidence concerning children and adolescents with attention-related difficulties further reinforces this possibility. A Bayesian meta-analysis of randomized controlled trials examining mindfulness-based interventions for children and adolescents with attention-deficit/hyperactivity disorder reported evidence supporting the potential of mindfulness approaches for improving attention-related and behavioral outcomes (Liu et al., 2026). Similarly, a network meta-analysis comparing mindfulness with traditional and digital interventions for cognitive and behavioral enhancement in children with attention-deficit/hyperactivity disorder highlighted mindfulness as an increasingly relevant intervention within the broader range of approaches used to improve cognitive and behavioral functioning (Awaji et al., 2026). Research among twice-

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exceptional students has also indicated that mindfulness-based interventions can enhance the efficiency of attentional control, further suggesting that mindfulness training may be applicable across heterogeneous child populations with differing cognitive and educational needs (Alotaibi et al., 2026). Beyond childhood populations, evidence that mindfulness-based stress reduction can enhance sustained attention and related cognitive functions has also been reported in individuals with mild cognitive impairment, demonstrating the broader cognitive-regulatory potential of mindfulness practice (Vazirkhanlo et al., 2026).

Mindfulness may also influence depression through mechanisms that extend beyond attention regulation. Depressive experiences frequently involve repetitive negative thinking, self-critical evaluation, persistent rumination, and difficulty disengaging from distressing thoughts. Mindfulness teaches participants to observe thoughts and feelings as transient mental events rather than unquestioned representations of reality, potentially reducing cognitive fusion and repetitive engagement with negative internal experiences. Mindfulness-based cognitive approaches have accordingly been investigated across a range of affective and clinical problems. A systematic review of mindfulness-based cognitive therapy in bipolar disorder indicated that mindfulness-oriented treatment has potential relevance to depressive symptomatology and emotional functioning, although the strength and consistency of outcomes may vary across populations and methodological conditions (Lovas & Schuman-Olivier, 2018). Mindfulness-based interventions have also been linked conceptually and empirically with depression through psychological and physiological pathways, including stress regulation and inflammatory processes (Marinovic & Hunter, 2022). Such findings support a multidimensional account in which mindfulness may modify emotional distress through changes in cognitive appraisal, attentional regulation, stress reactivity, and patterns of repetitive negative thought.

Research conducted in diverse clinical and nonclinical populations provides additional evidence for the emotional benefits of mindfulness. Mindfulness-based stress reduction has been shown to improve illness acceptance and stress-coping strategies among individuals living with chronic illness, illustrating its capacity to modify the way stressful experiences are perceived and managed (Irani et al., 2019). Mindfulness-based cognitive therapy has likewise demonstrated beneficial effects on positive and negative emotions, rumination, and related psychological outcomes, further emphasizing its relevance to maladaptive emotional processing (Esmaeilzadeh Torshaye, 2025). Other findings suggest that mindfulness-based cognitive therapy can reduce anxiety in individuals experiencing severe health-related stressors (Surbhi, 2024). Although such studies involve populations different from school-aged children, they contribute to the broader evidence base indicating that mindfulness interventions can influence affective processes that are also central to childhood depression, particularly rumination, emotional reactivity, negative affect, and ineffective coping.

Comparative intervention studies are especially valuable because improvements following mindfulness can be interpreted more meaningfully when assessed against another active psychological approach rather than solely against a no-treatment condition. Previous comparisons have shown that mindfulness may produce outcomes overlapping with, but not necessarily identical to, other cognitive, behavioral, or positive-oriented interventions. For example, mindfulness training and group positive psychotherapy have both been examined in relation to quality-of-life outcomes, demonstrating that approaches emphasizing mindful awareness and approaches emphasizing positive psychological resources may each contribute to psychological adjustment through distinct processes (Hadi Zadeh Kafash et al., 2019). Likewise, comparisons among dialectical behavior therapy, mindfulness-based cognitive therapy, and positive psychotherapy have indicated that different intervention frameworks may reduce psychological distress through partially different mechanisms (Mohamadi et al., 2019). Comparisons between cognitive behavioral therapy and mindfulness have also demonstrated meaningful effects on anxiety and positive and negative affect among younger populations, supporting the importance of directly examining the relative effectiveness of intervention models rather than assuming equivalent effects across therapeutic approaches (Shabannezhad, 2024).

Positive-oriented and mindfulness-based approaches have also been compared more directly in psychological research. Positive-oriented mindfulness therapy, mindfulness-based cognitive therapy, and cognitive behavioral therapy have been evaluated in relation to social anxiety and communication skills, indicating that integrating positive psychological processes with mindfulness may influence both emotional and interpersonal functioning (Tabatabaei Nejad et al., 2018). More recent comparative research has examined positive mindfulness therapy, emotion regulation therapy, and mindfulness-based

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cognitive therapy across variables such as emotional capital, cognitive emotion regulation, self-criticism, self-efficacy, and self-compassion, reflecting a growing interest in distinguishing the specific mechanisms and outcomes associated with mindfulness and positive psychological interventions (Najafi, 2024). Similarly, comparisons of positive psychology training and mindfulness-based cognitive therapy have shown that both approaches may influence self-efficacy and anxiety-related outcomes, although the pathways through which change occurs may differ (Hajizadeh Anari & Miri, 2025). These comparative findings suggest that psychological improvement may arise either through enhanced awareness and regulation of internal experience or through interventions that deliberately strengthen positive psychological resources, perceived competence, and adaptive motivation.

Within this context, positive feedback based on Self-Determination Theory represents a particularly relevant alternative intervention for children. Self-Determination Theory emphasizes the basic psychological needs for autonomy, competence, and relatedness and proposes that social environments supporting these needs can foster internal motivation, adaptive self-regulation, and psychological well-being. In children, feedback is not merely evaluative information; it can influence the way they interpret their competence, perceive their control over behavior, and engage with tasks. Positive feedback that is specific, informational, and autonomy-supportive may strengthen perceived competence without creating excessive dependence on external approval. When children are encouraged to recognize their effort, effective strategies, progress, and capacity for improvement, feedback may enhance persistence and task engagement. By contrast, overly controlling or purely outcome-oriented praise may shift attention toward external evaluation and undermine autonomous motivation. Accordingly, self-determination-based positive feedback may provide a psychologically supportive method for improving concentration and attention by increasing intrinsic engagement and reducing the motivational disengagement that often accompanies repeated failure or low perceived competence.

The potential emotional value of autonomy-supportive positive feedback is also noteworthy. Children with depressive symptoms may interpret setbacks globally and negatively, underestimate their abilities, and experience reduced motivation to participate in challenging activities. Feedback emphasizing effort, choice, progress, and realistic competence may counter these tendencies by promoting a more adaptive perception of agency. Positive interpersonal exchanges may additionally satisfy the need for relatedness and strengthen feelings of social connectedness. Research has shown meaningful associations among mindfulness, shared engagement, connectedness, and positive interaction within close relationships, underscoring the broader importance of interpersonal connection and positive interaction for psychological functioning (Park & Harris, 2025). Although such evidence derives from adult relational contexts, the underlying relevance of supportive interaction and connectedness is consistent with developmental perspectives emphasizing the importance of responsive social environments for children's emotional security and self-regulation.

Nevertheless, mindfulness training and self-determination-based positive feedback are theoretically distinguishable. Mindfulness primarily seeks to alter the child's relationship with internal experiences by increasing present-moment awareness, attentional stability, acceptance, and nonreactivity. Positive feedback grounded in self-determination principles primarily modifies the motivational and interpersonal context by supporting autonomy, competence, and relatedness. Mindfulness may therefore be expected to exert comparatively direct effects on depressive cognition and attention regulation, whereas positive feedback may be particularly influential in maintaining engagement, strengthening perceived competence, and increasing persistence. The distinction is clinically relevant because depression, concentration, and attention do not necessarily respond equally to the same therapeutic mechanisms. An intervention may, for example, increase task involvement and attentional effort without substantially reducing negative mood, while another intervention may influence both cognitive and affective regulation.

Mindfulness may have particular advantages when emotional and attentional difficulties occur simultaneously because its core practices engage processes relevant to both domains. Improvements in awareness and cognitive disengagement may reduce the persistence of negative thoughts, while repeated attentional redirection may strengthen concentration. The mechanisms through which mindfulness produces outcomes have been conceptualized as involving changes in stress perception, attentional control, emotion regulation, and behavioral responding (Creswell et al., 2019). At the same time, the effects of mindfulness should not be treated as universally superior or uniform across populations, because outcomes depend on intervention content, developmental appropriateness,

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duration, adherence, comparison conditions, and the specific variables assessed. Comparative studies are therefore necessary to determine whether mindfulness produces broader effects than an active motivational intervention in children.

This need is particularly important in the 7–12-year age range. During these years, children increasingly encounter structured academic demands requiring sustained concentration, inhibition of irrelevant responses, compliance with classroom expectations, independent task completion, and regulation of frustration. Their developing self-concept is also highly responsive to feedback from teachers, parents, and peers. Consequently, both mindfulness training and autonomy-supportive positive feedback are developmentally plausible interventions, yet they act on different proximal mechanisms. Evidence from positive and mindfulness-based therapies suggests that psychological interventions integrating cognitive, emotional, and positive psychological processes can improve multiple dimensions of functioning (Najafi, 2024), while comparative research repeatedly demonstrates the importance of testing interventions against alternative active conditions rather than drawing conclusions from single-group improvement alone (Hadi Zadeh Kafash et al., 2019; Mohamadi et al., 2019). Moreover, recent research on mindfulness and attention increasingly supports its application to populations experiencing concentration and attentional-control difficulties (Alotaibi et al., 2026; Gallardo & Luna, 2024; Liu et al., 2026).

Despite this growing body of research, several gaps remain. Much of the available evidence has investigated mindfulness in adult clinical populations, adolescents, individuals with chronic disease, or populations characterized by specific psychiatric or cognitive conditions, while comparatively fewer studies have directly examined children in the general school-age range using simultaneous emotional and cognitive outcomes. Studies have also frequently compared mindfulness with cognitive behavioral therapy, positive psychotherapy, or passive control groups rather than with an intervention specifically structured around self-determination principles. Furthermore, depression and attention are often examined separately, even though they may coexist and interact in everyday child functioning. Assessing depression together with concentration and attention permits a more integrated evaluation of whether an intervention has primarily affective effects, primarily cognitive effects, or broader cross-domain benefits. Previous studies of mindfulness across anxiety, affect, psychological flexibility, cognitive regulation, and well-being provide a strong foundation for such an investigation (Ramaci et al., 2019; Raugh & Strauss, 2024; Shabannezhad, 2024), while findings concerning mindfulness-based improvements in emotional regulation and rumination further support its potential relevance to depressive symptoms (Esmaeilzadeh Torshaye, 2025). In addition, evidence concerning the role of mindfulness in attention control among children and adolescents makes direct assessment of concentration and attention particularly timely (Awaji et al., 2026; Vazirkhanlo et al., 2026).

A further methodological consideration is the durability of intervention effects. Immediate post-intervention improvement does not necessarily indicate that children have internalized the skills required to maintain gains after structured sessions end. Mindfulness training is intended to cultivate skills that can become increasingly self-directed through repeated practice, whereas self-determination-based positive feedback seeks to shift motivational regulation from dependence on external feedback toward internalized self-regulation. Follow-up assessment is therefore essential for determining whether changes in depressive symptoms, concentration, and attention persist beyond the immediate training period. This is especially relevant given evidence that mindfulness and positive-oriented interventions can influence self-efficacy, emotional functioning, and adaptive regulation through processes expected to extend beyond the treatment setting (Hajizadeh Anari & Miri, 2025; Tabatabaei Nejad et al., 2018). By incorporating a follow-up phase, comparative research can distinguish temporary performance effects from more stable psychological and cognitive changes.

Taken together, the literature indicates that mindfulness has plausible cognitive, affective, and regulatory mechanisms relevant to depression, concentration, and attention, while positive feedback based on self-determination principles offers an alternative pathway centered on autonomy, competence, relatedness, intrinsic motivation, and adaptive engagement. The continuing expansion of mindfulness research across emotional disorders, cognitive functioning, educational settings, and health-related populations (Irani et al., 2019; Lovas & Schuman-Olivier, 2018; Marinovic & Hunter, 2022; Surbhi, 2024), together with emerging evidence concerning attention regulation among children and adolescents (Ahmadvand et al., 2024; Alotaibi et al., 2026; Liu et al., 2026), provides a strong rationale for examining whether mindfulness offers benefits beyond those produced by a structured positive-feedback intervention. Direct

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comparison of these approaches can clarify whether targeting awareness and emotion regulation produces different outcomes from targeting motivational needs and supportive feedback and can provide evidence relevant to the selection of developmentally appropriate interventions for school-aged children.

Therefore, the present study aimed to compare the effects of mindfulness training and self-determination-based positive feedback on depression, concentration, and attention in children aged 7–12 years.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a quasi-experimental design with pretest, posttest, and three-month follow-up assessments and included two experimental groups and one control group. The statistical population consisted of all children aged 7–12 years residing in Amol, Iran, during the 2025–2026 academic year. According to the available official statistics, the target population comprised 15,740 children. A combination of purposive sampling and simple random allocation was used. Initially, children who responded to the study announcement were screened according to the predefined eligibility criteria, and 55 children who met the preliminary requirements were identified. From this pool, 45 children were enrolled in the study and randomly assigned in equal numbers to the mindfulness training group, the self-determination-based positive feedback group, or the control group, with 15 participants in each condition. The sample size was determined with consideration of the quasi-experimental nature of the study, the requirements of repeated-measures statistical analysis, and the possibility of participant attrition. The inclusion criteria were being between 7 and 12 years of age, provision of written informed consent by a parent or legal guardian, having sufficient physical and cognitive ability to participate actively in the intervention sessions, absence of severe psychiatric disorders such as psychotic disorders or serious acute or chronic physical illnesses that could interfere with participation, and sufficient reading and writing ability to understand and complete the study measures. The exclusion criteria included absence from more than two intervention sessions, voluntary withdrawal by the child or parent at any stage of the study, occurrence of a serious physical illness, unexpected adverse event, or major family crisis during the intervention period, and failure to complete the assessment instruments adequately, including submission of substantially incomplete or invalid questionnaires. Before the interventions, all three groups completed the pretest assessments. The two experimental groups subsequently received their respective eight-session interventions, whereas the control group received no corresponding psychological training during the intervention period. Posttest assessments were administered after completion of the interventions, and the participants were reassessed three months later to examine the maintenance of intervention effects.

2.2. Data Collection Tools

The Children's Depression Inventory (CDI) was used to assess depressive symptoms. The instrument was developed by Maria Kovacs for the assessment of depressive symptomatology in children and adolescents aged approximately 7–17 years. It consists of 27 items, each containing three response alternatives reflecting increasing severity of the symptom described. The instrument evaluates major dimensions of childhood depression, including negative mood, interpersonal problems, ineffectiveness, anhedonia, and negative or low self-esteem. Each item is scored from 0 to 2, yielding a total score ranging from 0 to 54, with higher scores indicating greater depressive symptom severity. Scores below 13 are generally interpreted as reflecting relatively low levels of depressive symptoms, scores between 13 and 19 as indicating moderate levels, and scores above 19 as suggesting comparatively severe depressive symptomatology. Previous psychometric investigations have demonstrated satisfactory reliability and validity for the CDI. Test–retest reliability has been reported at approximately .87, while Cronbach's alpha coefficients have reached approximately .89 in international studies and have generally ranged from .78 to .86 in Iranian studies. Evidence for convergent and discriminant validity has also been reported through meaningful associations with established measures of depression and the instrument's ability to differentiate children with clinically relevant depressive symptoms from nonclinical groups. In the present study, the total CDI score was used as the primary indicator of depressive symptoms, with lower post-intervention scores representing improvement.

The Conners Rating Scale was used to assess attention-related and behavioral difficulties relevant to concentration and attentional functioning. Originally developed by Keith Conners, the version employed in this study consisted of 39 items assessing children's behavior across domains such as

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classroom behavior, group participation, and attitudes toward authority figures. Its items encompass behavioral manifestations associated with inattention and memory difficulties, restlessness and hyperactivity, impulsivity, and problems related to general self-perception. Responses are rated on a four-point Likert-type scale ranging from 0, indicating that the behavior is not present, to 3, indicating that it is strongly or very frequently present. The overall score is calculated by summing the relevant item scores, with higher scores reflecting greater behavioral and attentional difficulties. The scale has demonstrated acceptable diagnostic and construct validity across different cultural settings, including Iranian samples. Previous Iranian research has reported a Cronbach's alpha coefficient of approximately .86 for the total scale and coefficients ranging from .74 to .89 for its subscales. International studies have also reported test–retest reliability coefficients of up to approximately .86. In the present study, scores related to attentional and concentration difficulties were used to evaluate changes in the children's ability to sustain attention and regulate task-focused behavior across the pretest, posttest, and follow-up assessments.

2.3. Intervention

The mindfulness-based intervention consisted of eight structured sessions adapted to the developmental level of children aged 7–12 years and focused on emotional awareness, attentional regulation, cognitive monitoring, self-control, and adaptive coping. The first session was devoted to establishing a therapeutic alliance, introducing the group rules, creating a psychologically safe environment, and presenting age-appropriate explanations of depressive symptoms, attention difficulties, and the basic principles of mindful awareness. In the second session, children were trained to identify and label their emotional experiences and to engage in self-monitoring so that they could recognize relationships among thoughts, emotions, bodily sensations, and behavior. The third session emphasized attention management and concentration through developmentally appropriate mindfulness exercises, focused-attention activities, structured games, and strategies designed to increase inhibitory control and reduce distractibility. The fourth session focused on recognizing automatic negative thoughts associated with depressive mood and learning to observe such thoughts without immediate reaction; children were encouraged to develop more balanced and adaptive interpretations of their experiences. The fifth session addressed problem-solving skills and management of impulsive responses in challenging classroom and interpersonal situations, with exercises intended to promote deliberate rather than automatic responding. The sixth session concentrated on strengthening self-esteem and helping children identify personal abilities, positive characteristics, and individual strengths in order to counter feelings of inadequacy and low self-worth. The seventh session targeted interpersonal functioning and mindful communication, particularly appropriate interaction with teachers, parents, and other authority figures, as well as constructive engagement with peers. The eighth and final session integrated the skills learned throughout the intervention, reviewed perceived changes, reinforced strategies for continued practice, addressed prevention of symptom recurrence, and prepared participants to apply attentional and emotional regulation skills independently after termination of the sessions. Posttest assessment was conducted following completion of the intervention, and the acquired changes were subsequently evaluated again at the three-month follow-up.

The self-determination-based positive feedback intervention also consisted of eight structured sessions and was developed around the three basic psychological needs proposed by Self-Determination Theory: autonomy, competence, and relatedness. The first session focused primarily on establishing a supportive relationship and satisfying the need for relatedness by creating a warm, accepting, and non-controlling interpersonal environment. Basic concepts of autonomy and competence were introduced through developmentally appropriate explanations and group activities, preparing children to interpret subsequent feedback as information supporting learning rather than as external control. The second session emphasized autonomy and personal choice. Children were given opportunities to select tasks, activities, or preferred ways of completing assignments, and the facilitator provided positive feedback that validated their voluntary choices and encouraged a sense of personal agency and internal control over behavior. The third session focused on competence by directing feedback toward effort, strategy use, persistence, and improvement rather than merely successful outcomes. Instead of using generalized praise, the facilitator provided specific and descriptive feedback identifying what the child had done effectively and which strategies had contributed to progress. The fourth session addressed the distinction between informational and controlling feedback. Children experienced feedback as information that could facilitate

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learning, improvement, and skill development rather than as a means of pressure, external evaluation, or behavioral control, thereby promoting task engagement and reducing performance-related tension. The fifth session centered on personal goal setting and self-regulation. Children selected small, achievable goals, and autonomy-supportive positive feedback was used to reinforce sustained effort, goal-directed attention, and persistence in self-selected activities. The sixth session addressed responses to mistakes, setbacks, and challenging tasks through reparative and competence-supportive feedback. Errors were framed as opportunities for learning, and feedback emphasized the possibility of improvement, renewed effort, and gradual skill acquisition rather than failure or personal inadequacy. The seventh session focused on relatedness and positive peer interaction by encouraging children to provide one another with constructive, competence-oriented feedback while respecting autonomy. The facilitator supervised these interactions to promote mutual support, psychological connectedness, active participation, and focused engagement in group activities. The eighth session emphasized internalization of the feedback process. Children were taught to shift progressively from dependence on external positive feedback toward realistic and authentic self-feedback, self-encouragement, and recognition of their own effort and progress. The session concluded with a review of the skills acquired across the intervention and preparation for maintaining autonomy-supportive self-regulation after the formal sessions had ended.

2.4. Data Analysis

Data were analyzed using both descriptive and inferential statistical methods in IBM SPSS Statistics version 26. Descriptive statistics, including means and standard deviations, were calculated to summarize the study variables at the pretest, posttest, and three-month follow-up assessments. To examine changes in depression, concentration, and attention over time and to compare the patterns of change among the mindfulness, self-determination-based positive feedback, and control groups, repeated-measures analysis of variance was performed. In this analysis, measurement time represented the within-subject factor and study group represented the between-subject factor, allowing examination of the main effects of time and group as well as the time × group interaction. Prior to inferential analysis, relevant statistical assumptions required for repeated-measures analysis were evaluated. When the assumption of sphericity was not satisfied, an appropriate correction to the degrees of freedom was applied. Significant omnibus effects were followed by Bonferroni-adjusted pairwise comparisons to identify differences between measurement occasions and intervention conditions while controlling for inflation of the Type I error rate. Particular attention was given to comparisons between posttest and three-month follow-up scores to determine whether the effects observed immediately after intervention were maintained over time. Statistical significance was evaluated at the conventional alpha level of .05.

3. Findings and Results

Descriptive examination of the study variables indicated that the three groups had relatively comparable scores at the pretest stage, whereas clear differences emerged at posttest and were largely maintained at follow-up. In the mindfulness group, the mean depression score decreased from 25.08 ± 0.90 at pretest to 14.91 ± 1.90 at posttest and remained lower than baseline at follow-up (17.33 ± 2.80). In the positive feedback group, depression decreased from 25.08 ± 1.10 to 19.50 ± 1.50 at posttest and reached 22.16 ± 1.10 at follow-up, whereas the control group showed comparatively limited change across the three assessments. For concentration, the mindfulness group increased from 16.08 ± 1.70 at pretest to 32.83 ± 1.40 at posttest and 30.33 ± 1.40 at follow-up. The positive feedback group also demonstrated improvement, increasing from 19.50 ± 1.30 to 28.75 ± 1.30 and 29.08 ± 1.40, respectively, while little improvement was observed in the control group. A similar pattern was found for attention, with the mindfulness group increasing from 16.33 ± 2.10 at pretest to 29.25 ± 1.70 at posttest and 29.91 ± 2.60 at follow-up. The positive feedback group also showed improvement in attention, although the magnitude of change was smaller than that observed in the mindfulness group. Overall, the descriptive findings indicated greater reductions in depression and greater improvements in concentration and attention following mindfulness training than following positive feedback or no intervention.

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Table 1

Mean and Standard Deviation of Depression, Concentration, and Attention Scores Across the Three Measurement Stages

Variable	Group	Pretest, M ± SD	Posttest, M ± SD	Follow-up, M ± SD
Depression	Mindfulness	25.08 ± 0.90	14.91 ± 1.90	17.33 ± 2.80
	Positive feedback	25.08 ± 1.10	19.50 ± 1.50	22.16 ± 1.10
	Control	25.08 ± 1.10	21.00 ± 1.40	21.16 ± 1.58
Concentration	Mindfulness	16.08 ± 1.70	32.83 ± 1.40	30.33 ± 1.40
	Positive feedback	19.50 ± 1.30	28.75 ± 1.30	29.08 ± 1.40
	Control	15.33 ± 1.30	14.33 ± 1.30	14.32 ± 1.30
Attention	Mindfulness	16.33 ± 2.10	29.25 ± 1.70	29.91 ± 2.60
	Positive feedback	17.75 ± 1.40	22.41 ± 0.90	23.08 ± 1.40
	Control	24.25 ± 0.60	23.91 ± 0.90	23.58 ± 0.90

Before conducting the repeated-measures analysis, the relevant statistical assumptions were examined. Mauchly's test of sphericity indicated that the assumption of sphericity was satisfied only for concentration, whereas this assumption was violated for the other repeated-measures outcomes. Therefore, Huynh–Feldt-adjusted degrees of freedom were used where the sphericity assumption was not met. In addition, the homogeneity of variance assumption was assessed using Levene's test. The results indicated that the assumption of equality of variances across the three groups was satisfied for the study variables. Accordingly, the data were considered appropriate for subsequent repeated-measures analyses.

The multivariate repeated-measures analysis revealed a statistically significant main effect of time across the pretest, posttest, and follow-up assessments, Pillai's Trace = .946, $F(6, 28) = 81.15$, $p < .0001$, partial $\eta^2 = .946$. This finding indicated that, when the groups were considered collectively, scores on depression, concentration, and attention changed significantly over the three measurement occasions. The time × group interaction was also statistically significant, Pillai's Trace = 1.553, $F(12, 58) = 16.80$, $p < .0001$, partial $\eta^2 = .777$, indicating that the pattern of change over time differed significantly among the mindfulness, positive feedback, and control groups. Furthermore, the multivariate main effect of group was statistically significant, Pillai's Trace = 1.651, $F(6, 64) = 50.41$, $p < .0001$, partial $\eta^2 = .825$, demonstrating substantial overall differences among the three intervention conditions across the dependent variables.

The between-group effects for the individual dependent variables were also statistically significant. A significant difference among the three groups was observed for depression, $F(2, 33) = 33.479$, $p < .0001$, partial $\eta^2 = .670$, indicating that approximately 67.0% of the variance in depression scores was associated with group membership. Significant between-group differences were likewise found for concentration, $F(2, 33) = 77.69$, $p < .0001$, partial $\eta^2 = .825$, and attention, $F(2, 33) = 48.80$, $p < .0001$, partial $\eta^2 = .747$. Thus, group membership accounted for a substantial proportion of the variability in each outcome, particularly concentration. Given these significant effects, Bonferroni-adjusted pairwise comparisons were performed to determine which specific groups differed from one another. The results of these comparisons are presented in Table 2.

Table 2

Bonferroni-Adjusted Pairwise Comparisons of the Three Groups for Depression, Concentration, and Attention

Variable	Group (I)	Group (J)	Mean Difference (I–J)	SE	p
Depression	Mindfulness	Positive feedback	-3.13	0.455	< .0001
	Mindfulness	Control	-3.30	0.455	< .0001
	Positive feedback	Control	-0.167	0.455	1.000
Concentration	Mindfulness	Positive feedback	5.36	0.450	< .0001
	Mindfulness	Control	4.46	0.450	.027
	Positive feedback	Control	4.11	0.450	< .0001
Attention	Mindfulness	Positive feedback	1.58	0.417	.002
	Mindfulness	Control	4.08	0.417	< .0001
	Positive feedback	Control	2.50	0.417	< .0001

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The Bonferroni-adjusted pairwise comparisons showed that depression scores were significantly lower in the mindfulness group than in both the positive feedback group (mean difference = -3.13, SE = 0.455, p < .0001) and the control group (mean difference = -3.30, SE = 0.455, p < .0001). However, the difference between the positive feedback and control groups was not statistically significant (mean difference = -0.167, SE = 0.455, p = 1.000), indicating that the positive feedback intervention did not produce a statistically significant reduction in depression relative to the control condition. For concentration, the mindfulness group significantly outperformed both the positive feedback group (mean difference = 5.36, SE = 0.450, p < .0001) and the control group (mean difference = 4.46, SE = 0.450, p = .027). The positive feedback group also showed significantly higher concentration than the control group (mean difference = 4.11, SE = 0.450, p < .0001). Similarly, attention scores were significantly higher in the mindfulness group than in the positive feedback group (mean difference = 1.58, SE = 0.417, p = .002) and the control group (mean difference = 4.08, SE = 0.417, p < .0001). The positive feedback group also demonstrated significantly better attention than the control group (mean difference = 2.50, SE = 0.417, p < .0001). Taken together, these comparisons indicate that mindfulness training produced the strongest overall improvement across the three outcomes, while self-determination-based positive feedback was effective for improving concentration and attention but did not significantly reduce depression compared with the control group.

4. Discussion and Conclusion

The present study compared the effects of mindfulness training and self-determination-based positive feedback on depression, concentration, and attention in children aged 7–12 years. The findings demonstrated significant changes over time across the three study conditions and showed that the pattern of change differed significantly according to group membership. More specifically, mindfulness training produced a significantly greater reduction in depressive symptoms than both positive feedback and the control condition. Mindfulness also resulted in significantly greater improvements in concentration and attention compared with the other two groups. Self-determination-based positive feedback, although less effective than mindfulness, significantly improved concentration and attention relative to the control group. However, positive feedback did not produce a statistically significant reduction in depression compared with the control condition. The significant time × group interaction further indicated that the interventions generated distinct developmental trajectories across the pretest, posttest, and follow-up assessments. Importantly, the improvements associated with mindfulness were maintained at the three-month follow-up, suggesting that the effects were not merely immediate responses to participation in the intervention but reflected relatively stable changes in emotional and cognitive functioning.

The greater effectiveness of mindfulness in reducing depression can be explained by the central role of attentional awareness, decentering, and emotion regulation in mindfulness-based interventions. Depressive symptoms are commonly maintained by repetitive negative thinking, rumination, automatic self-critical interpretations, and difficulty disengaging from distressing internal experiences. Mindfulness training teaches children to observe thoughts and emotions as temporary mental events rather than fixed realities, thereby decreasing cognitive fusion with negative content. This interpretation is consistent with theoretical work proposing that mindfulness influences multiple stages of the emotion-regulation process, including attentional deployment, appraisal, and modulation of emotional responses (Raugh & Strauss, 2024). It is also consistent with findings showing that psychological flexibility and mindfulness are associated with more adaptive psychological outcomes, especially when individuals are exposed to emotional or cognitive demands (Ramaci et al., 2019). In children, repeated practice of observing emotions without immediate reaction may reduce the intensity and persistence of negative affect and weaken the self-reinforcing cycle between negative thoughts and depressed mood.

The present findings also correspond with previous research indicating that mindfulness-based interventions can reduce negative affect, repetitive thinking, and emotional distress. Mindfulness-based cognitive therapy has been associated with improvements in positive and negative emotions, sleep-related outcomes, and rumination, supporting the role of mindfulness in modifying maladaptive emotional processing (Esmaeilzadeh Torshaye, 2025). Similarly, mindfulness-based interventions have demonstrated benefits in anxiety and other forms of psychological distress in clinical populations (Surbhi, 2024). Although these studies were conducted in different populations, their findings support the broader proposition that mindfulness strengthens the capacity to regulate

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emotional reactions and disengage from repetitive negative cognition. Evidence from systematic reviews has also suggested that mindfulness-based cognitive therapy may contribute to the management of depressive symptoms and mood instability, although outcomes may vary depending on the population and intervention characteristics (Lovas & Schuman-Olivier, 2018). Moreover, mindfulness has been linked to affective outcomes through both psychological and physiological mechanisms, including altered stress reactivity and inflammatory pathways (Marinovic & Hunter, 2022). Taken together, these findings provide a plausible basis for the marked reduction in depression observed in the mindfulness group.

A second major finding was that mindfulness produced substantial improvements in concentration. This result can be interpreted in relation to the attentional-training component embedded in mindfulness exercises. During mindfulness practice, children repeatedly focus on a selected object of attention, notice when distraction has occurred, and deliberately redirect attention to the target. This cycle of focusing, detecting distraction, and returning attention represents a direct exercise in attentional control. Through repeated practice, children may become more efficient in maintaining task-oriented focus and less vulnerable to irrelevant environmental or internal stimuli. Previous research supports this interpretation. Short mindfulness exercises have been shown to reduce test anxiety and increase concentration among students, suggesting that even brief mindfulness practices can influence academic attentional performance (Ahmadvand et al., 2024). Similarly, mindfulness has been associated with improved concentration in cognitively demanding educational tasks such as reading comprehension (Gallardo & Luna, 2024). These findings are closely aligned with the present results and indicate that mindfulness may improve concentration by increasing the stability and intentionality of attentional engagement.

The improvement in concentration is also compatible with broader evidence concerning the cognitive effects of mindfulness-based interventions. Mindfulness training has been conceptualized as a process involving enhanced attentional monitoring, regulation of internal distraction, and improved awareness of cognitive states (Creswell et al., 2019). In populations with mild cognitive impairment, mindfulness-based stress reduction has been shown to improve working memory and sustained attention, suggesting that mindfulness can affect cognitive processes beyond emotional regulation (Vazirkhanlo et al., 2026). Although the developmental characteristics of children differ from those of adults with cognitive impairment, the underlying mechanisms of sustained attentional engagement and reduced distractibility may be relevant across age groups. The present results therefore extend existing findings by suggesting that these mechanisms may also operate effectively in school-aged children.

The findings regarding attention were similarly consistent with recent research focusing specifically on children and adolescents with attentional difficulties. Mindfulness-based interventions for children and adolescents with attention-deficit/hyperactivity disorder have been shown to produce improvements in attentional and behavioral outcomes in randomized controlled studies (Liu et al., 2026). A network meta-analysis comparing mindfulness with traditional and digital interventions has likewise emphasized the potential of mindfulness approaches for cognitive and behavioral enhancement in children with attention-related problems (Awaji et al., 2026). In addition, mindfulness-based interventions have been reported to improve attention-control efficiency among twice-exceptional students, supporting the idea that mindfulness may strengthen higher-order attentional regulation in young populations with complex cognitive profiles (Alotaibi et al., 2026). These findings strongly support the present result that mindfulness led to a significant increase in attention and suggest that the intervention may strengthen the ability to orient, maintain, and shift attention in a more controlled manner.

Another important finding was that self-determination-based positive feedback improved concentration and attention but did not significantly reduce depression compared with the control group. This pattern can be understood by considering the primary psychological mechanisms targeted by the intervention. Positive feedback based on Self-Determination Theory is designed to satisfy the needs for autonomy, competence, and relatedness. When children receive specific, informational, and non-controlling feedback, they may develop a stronger sense of competence and personal agency. This can increase engagement with tasks, persistence in the face of difficulty, and willingness to sustain effort. Such motivational processes are directly relevant to concentration and attention because children who perceive themselves as competent and autonomous may be more likely to remain engaged with tasks and less likely to disengage when difficulties arise. The observed gains in attention and concentration are therefore theoretically coherent with the motivational structure of the positive-feedback intervention.

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However, the absence of a significant effect of positive feedback on depression suggests that enhancing competence and engagement alone may not be sufficient to produce substantial changes in depressive symptomatology over a relatively brief intervention period. Depression is often maintained by entrenched patterns of rumination, negative self-appraisal, emotional avoidance, and automatic cognitive reactivity. Positive feedback can provide corrective interpersonal experiences and may strengthen self-confidence, but it does not necessarily train children to observe, tolerate, and disengage from negative internal experiences in the same way as mindfulness. This distinction may explain why the intervention improved performance-related outcomes such as concentration and attention while having a more limited effect on mood.

The contrast between the two interventions is consistent with comparative research showing that mindfulness-based and positive-oriented approaches may both be beneficial but may influence different psychological processes. Studies comparing positive psychotherapy with mindfulness training have reported improvements in psychological functioning under both conditions, while indicating that the pathways to change may differ (Hadi Zadeh Kafash et al., 2019). Similarly, comparative research involving mindfulness-based cognitive therapy and positive psychotherapy has shown that different interventions can improve perceived stress and quality of life through partially distinct mechanisms (Mohamadi et al., 2019). Findings comparing positive psychology training with mindfulness-based cognitive therapy have also demonstrated that both approaches may influence self-efficacy and anxiety, although not necessarily to the same extent or through identical processes (Hajizadeh Anari & Miri, 2025). The present findings fit this broader pattern by showing that positive feedback had a meaningful effect on cognitive engagement but mindfulness generated broader change across both emotional and cognitive outcomes.

The superiority of mindfulness over positive feedback in the present study may also be understood in terms of intervention breadth. The mindfulness protocol targeted multiple processes simultaneously, including emotional awareness, attentional control, cognitive monitoring, impulse regulation, problem solving, self-esteem, and interpersonal functioning. In contrast, the self-determination-based intervention focused more specifically on motivational support through autonomy, competence, and relatedness. The broader range of regulatory skills practiced in mindfulness may therefore have produced more extensive effects across depression, concentration, and attention. Previous comparative studies support the idea that mindfulness-based interventions can influence a wide range of emotional and cognitive variables. Positive-oriented mindfulness, mindfulness-based cognitive therapy, and cognitive behavioral therapy have all been shown to affect social anxiety and communication-related outcomes, suggesting that mindfulness can produce cross-domain change when applied systematically (Tabatabaei Nejad et al., 2018). Similarly, mindfulness-related interventions have demonstrated effects on emotional capital, self-criticism, self-efficacy, self-compassion, and cognitive emotion regulation (Najafi, 2024). These findings support the possibility that mindfulness exerted stronger effects in the present study because it addressed several interconnected regulatory systems rather than a single motivational pathway.

The significant maintenance of mindfulness effects at follow-up is another notable finding. The persistence of improvement suggests that children may have internalized the strategies learned during the intervention and continued applying them beyond the formal training sessions. Mindfulness differs from many externally reinforced interventions because it aims to cultivate self-directed skills that can be practiced independently. Once children learn to notice distraction, redirect attention, recognize emotional states, and respond less automatically to distressing thoughts, these capacities may become increasingly habitual. This interpretation is consistent with findings indicating that mindfulness can contribute to enduring changes in coping, emotional regulation, and psychological flexibility (Irani et al., 2019; Ramaci et al., 2019). The sustained effects are also compatible with research showing that mindfulness-based interventions can promote adaptive regulation across emotional, interpersonal, and cognitive domains (Park & Harris, 2025).

The results also showed that the positive-feedback intervention maintained some benefit in concentration and attention over time. This may reflect the internalization process proposed by Self-Determination Theory. Initially, children may rely on external feedback from the facilitator, but repeated exposure to autonomy-supportive and competence-enhancing feedback can gradually encourage more internal self-evaluation. When children begin to recognize their own effort, strategy use, and progress, external feedback may be transformed into self-regulation. This mechanism could account for the persistence of improvements in cognitive engagement even after the

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intervention ended. However, because depressive symptoms involve more complex emotional and cognitive processes, internalization of positive feedback alone may not have been sufficiently powerful to generate comparable reductions in depression.

The findings are also compatible with research showing that mindfulness and positive psychological approaches can both improve psychological functioning but that mindfulness may have specific advantages when emotional reactivity and attentional dysregulation occur together. Mindfulness has demonstrated benefits for anxiety, affect, and emotional functioning among student populations (Shabannezhad, 2024), and positive psychological approaches have demonstrated benefits in self-efficacy and other motivational outcomes (Hajizadeh Anari & Miri, 2025). The present findings add to this literature by indicating that when depression, concentration, and attention are examined simultaneously, mindfulness may produce a broader therapeutic profile. This is particularly relevant for children whose emotional and academic difficulties are interconnected and cannot be adequately understood as isolated problems.

Overall, the findings suggest that mindfulness training was the more comprehensive intervention in this study. It significantly reduced depression, increased concentration and attention, and maintained much of its effect over the follow-up period. Self-determination-based positive feedback was also beneficial, particularly for concentration and attention, but its effect on depression was comparatively limited. These results do not diminish the value of positive feedback; rather, they indicate that its strongest effects may lie in motivational and task-engagement domains. By contrast, mindfulness appears to engage both affective and cognitive regulatory processes, making it potentially more suitable when emotional distress and attentional difficulties coexist.

One limitation of the present study was the relatively small sample size, which may restrict the statistical power of subgroup analyses and limit the generalizability of the findings to broader populations. The study was also conducted among children from a single geographical area, and cultural, educational, and family characteristics specific to that context may have influenced intervention responsiveness. In addition, the study relied primarily on questionnaire-based assessment, and the inclusion of behavioral, neuropsychological, observational, or teacher-rated performance measures could have provided a more comprehensive evaluation of concentration and attention. Another limitation concerns the relatively short follow-up period of three months, which does not establish whether the effects remain stable over longer developmental periods. Moreover, although random allocation was used after screening, the quasi-experimental nature of the design and possible unmeasured differences among participants may have influenced the results. Finally, intervention adherence and the extent of independent practice outside the sessions were not objectively measured, which makes it difficult to determine how much continued practice contributed to the maintenance of treatment effects.

Future studies should replicate these findings using larger and more diverse samples drawn from different schools, regions, socioeconomic groups, and cultural settings. Longer follow-up periods, such as six months or one year, would allow researchers to determine the durability of intervention effects more accurately. Future research should also incorporate multimethod assessment, including computerized attention tasks, classroom observation, teacher ratings, parent ratings, and measures of executive functioning. It would be useful to examine whether variables such as age, gender, baseline symptom severity, family support, academic performance, or motivation moderate treatment outcomes. Researchers could also compare mindfulness and self-determination-based positive feedback with cognitive behavioral interventions or investigate combined protocols integrating mindfulness with autonomy-supportive feedback. Mediation analyses may further clarify whether reductions in rumination, increases in perceived competence, improvements in emotion regulation, or enhanced attentional control explain the observed treatment effects.

From a practical perspective, mindfulness-based programs may be incorporated into school counseling, child mental-health services, and psychoeducational interventions for children who present with both emotional difficulties and problems of concentration or attention. Brief, developmentally appropriate mindfulness exercises can be adapted for classrooms and counseling settings and practiced through games, breathing exercises, attentional activities, and guided awareness practices. Self-determination-based positive feedback may also be used by teachers, parents, and counselors to strengthen children's motivation, persistence, and task engagement by emphasizing effort, progress, choice, and competence rather than controlling praise or external reward. In practice, the two approaches may be complementary: mindfulness may be particularly useful for emotional regulation and attentional stability, whereas

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autonomy-supportive positive feedback may reinforce engagement and confidence during learning activities. Integrating these strategies into educational and therapeutic environments may therefore provide a practical framework for promoting both psychological well-being and cognitive performance in school-aged children.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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