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Comparison of the Effectiveness of Child-Centered Mindfulness Training and Art (Drawing) Therapy on Behavioral Problems and Cognitive Assessment in Children with Hearing Loss in the City of Bukan

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A B S T R A C T

The aim of the present study was to compare the effectiveness of child-centered mindfulness training and art (drawing) therapy on behavioral problems and cognitive assessment in children with hearing loss in the city of Bukan. This study was applied in nature and, in terms of data collection, employed a semi-experimental field design. The research method was a quasi-experimental pretest–posttest design with a control group and a follow-up period. The study population consisted of all male and female children with hearing loss in Bukan County. A total of 45 children were assigned to three groups: two intervention groups with 15 participants each and one control group with 15 participants. The research instruments included two educational intervention packages and two questionnaires. The child-centered mindfulness training package was based on the program developed by Bordick (2017), and the art therapy training package was based on Martin's program (2009). In addition, the Revised Behavior Problem Checklist for Children and Adolescents (RBPC) developed by Quay and Peterson, and the Children's Cognitive Assessment Questionnaire (CCAQ) developed by Zater and Chassin, were used in this study. Based on the findings, no statistically significant difference was observed between the effectiveness of the two interventions in reducing children's cognitive assessment scores ($p < .05$). On the other hand, neither intervention had a statistically significant effect on reducing behavioral problems in children ($p > .05$). It can be concluded that both therapeutic approaches may be used as effective interventions for improving certain psychological and cognitive aspects of children with hearing loss; however, alternative or complementary approaches may be required to address behavioral problems.

Keywords: *mindfulness, art (drawing) therapy, perceived competence, cognitive assessment, hearing loss.*

1. Introduction

Hearing impairment in childhood is widely recognized as a multidimensional developmental condition that extends beyond sensory limitations and exerts profound effects on cognitive, emotional, social, and behavioral functioning. Children with hearing loss often experience persistent challenges in communication, peer interaction, emotional regulation, and academic engagement, which collectively increase their vulnerability to behavioral problems and maladaptive cognitive appraisals (Naimati, 2020; Paterson et al., 2020). Empirical evidence suggests that limitations in auditory input disrupt not only language acquisition but also higher-order cognitive processing, including attention control, emotional interpretation, and social understanding, thereby predisposing these children to anxiety, aggression, and difficulties in self-regulation (Jalali Mir et al., 2021; Lupo et al., 2020). As a result, identifying effective psychosocial interventions that are developmentally appropriate and accessible for children with hearing impairment has become a critical priority in contemporary psychological and educational research.

Behavioral problems in children with hearing loss frequently manifest in the form of conduct-related difficulties, attention deficits, social aggression, and heightened anxiety. These difficulties are often reinforced by social exclusion, reduced peer acceptance, and repeated experiences of misunderstanding or failure in communication contexts (Paterson et al., 2020; Romppanen et al., 2021). Research indicates that such behavioral manifestations are not merely secondary outcomes of sensory impairment but are closely intertwined with children's cognitive evaluations of themselves and their environments, particularly negative self-appraisals, maladaptive thought patterns, and diminished perceptions of competence (Mansouri Nejad et al., 2021; Ziaee et al., 2021). Consequently, interventions targeting both behavioral symptoms and underlying cognitive processes are essential for promoting adaptive functioning and psychological well-being in this population.

Within this context, mindfulness-based interventions have received increasing attention as evidence-based approaches for enhancing self-regulation, emotional awareness, and cognitive flexibility in children and adolescents. Mindfulness is commonly defined as purposeful, nonjudgmental attention to present-moment experiences, encompassing bodily sensations, thoughts, emotions, and environmental stimuli (McKay & Benjamin, 2021). In pediatric populations, mindfulness-based programs have been shown to improve attention regulation, reduce anxiety, and mitigate behavioral problems by strengthening executive control and emotional awareness (Wong et al., 2024; Zaccari et al., 2022). Importantly, child-centered mindfulness training adapts core mindfulness principles to the developmental level of children through play, imagery, bodily awareness, and experiential exercises, making it particularly suitable for children with sensory or communication challenges (Keshavarz Valian et al., 2022; Shahbazi et al., 2021).

Evidence supporting the effectiveness of child-centered mindfulness interventions has steadily accumulated across diverse clinical and educational settings. Studies have demonstrated that mindfulness training can significantly enhance self-control, social competence, and emotional regulation in children with attention-deficit/hyperactivity disorder, anxiety disorders, and low self-regulation (Lahak & Asadi, 2020; Zaccari et al., 2022). In populations with hearing impairment, mindfulness-based approaches have shown promising effects on happiness, social anxiety, and emotional adjustment, suggesting that mindfulness may compensate, at least partially, for deficits in auditory-mediated self-regulatory processes (Heidari Darani & Manshi, 2022; Rahimi Pardenjani et al., 2021). Moreover, mindfulness has been linked to reductions in fear of negative evaluation and improvements in self-efficacy, both of which are critical cognitive factors influencing behavioral outcomes in children with communication-related vulnerabilities (Amemiya & Sakairi, 2021; Estadian Komar Aliya & Aghababa, 2022).

Parallel to mindfulness-based approaches, art therapy—particularly drawing-based and expressive art interventions—has emerged as a powerful nonverbal modality for addressing emotional and cognitive difficulties in children. Art therapy facilitates the externalization of internal experiences through symbolic representation, allowing children to express emotions and thoughts that may be difficult to articulate verbally (Miller, 2020). This feature is especially relevant for children with hearing impairment, whose expressive and receptive language limitations may hinder traditional verbal psychotherapy (Mohammadi Kashka et al., 2022; Zeynali Dehrajabi & Ashouri, 2021). Through structured and unstructured art activities, children can explore self-concept, emotional conflicts, and interpersonal relationships in a supportive and developmentally sensitive context.

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Empirical findings consistently indicate that art therapy interventions can reduce anxiety, aggression, and emotional distress while enhancing social competence, self-esteem, and emotional insight in children and adolescents (Mardani et al., 2020; Rahna & Nithya, 2022). Drawing-based art therapy has been shown to be particularly effective in reducing aggressive behaviors and emotional dysregulation among children with hearing impairment, underscoring its suitability for this population (Pakzadmoghadam et al., 2023; Rahimi Pardenjani et al., 2021). Furthermore, contemporary developments in art therapy, including mandala-based and guided imagery approaches, have demonstrated positive effects on emotional regulation, self-awareness, and cognitive restructuring (Moafi Pour et al., 2022; Qiu-Qiang et al., 2021).

Recent advances in the field have also highlighted the cognitive mechanisms underlying both mindfulness and art therapy interventions. Mindfulness-based practices are theorized to modify maladaptive cognitive appraisals by increasing metacognitive awareness and reducing automatic, judgmental thought patterns (Carney et al., 2023; Ramos Salazar, 2022). Similarly, art therapy has been associated with changes in emotional and social cognition, including improved self-acceptance, adaptive thinking, and emotional insight (Feng & Bai, 2025; Zhai, 2025). These shared cognitive pathways suggest that both interventions may influence behavioral outcomes indirectly through their effects on children's cognitive evaluations and thought processes.

Despite the growing body of research supporting mindfulness and art therapy independently, comparative studies examining their relative effectiveness—particularly among children with hearing impairment—remain limited. Most existing studies have focused on single-intervention designs or have examined these approaches in typically developing populations or children with other neurodevelopmental conditions (Rahmani et al., 2024; Shabannezhad, 2024). Moreover, few studies have simultaneously assessed behavioral problems and cognitive appraisal processes as integrated outcomes, even though theoretical models emphasize their reciprocal relationship (McKay & Benjamin, 2021; Romppanen et al., 2021). This gap is particularly salient in the context of hearing-impaired children, for whom nonverbal and experiential interventions may hold distinct advantages.

In addition, cultural and contextual factors play an important role in shaping the effectiveness of psychosocial interventions. Studies conducted in non-Western contexts have emphasized the need for culturally adapted, child-centered approaches that align with family values, educational systems, and social expectations (Rahimi Pardenjani et al., 2021; Ziaee et al., 2021). Both mindfulness and art therapy offer flexible frameworks that can be adapted to diverse cultural settings, yet empirical evidence comparing their outcomes within specific cultural contexts remains insufficient (Ramos Salazar, 2022; Yoon & Yu, 2025). Addressing this gap can contribute to the development of evidence-based, culturally responsive interventions for children with special needs.

Given the theoretical relevance and empirical support for both child-centered mindfulness training and drawing-based art therapy, a systematic comparison of their effects on behavioral problems and cognitive assessment in children with hearing impairment is warranted. Such a comparison can provide valuable insights into the relative strengths and limitations of each approach, inform clinical decision-making, and guide the design of integrative intervention programs that address both behavioral symptoms and underlying cognitive processes (Feng & Bai, 2025; Zaccari et al., 2022). Furthermore, examining intervention effects across multiple outcome domains can enhance understanding of how experiential therapies contribute to psychological resilience and adaptive functioning in vulnerable child populations.

Accordingly, the aim of the present study was to compare the effectiveness of child-centered mindfulness training and drawing-based art therapy on behavioral problems and cognitive assessment in children with hearing impairment.

2. Methods and Materials

2.1. Study Design and Participants

This study was applied in nature and, in terms of data collection, employed a semi-experimental field design with a follow-up period. The present research used a quasi-experimental pretest–posttest design with a control group. Accordingly, after administering the pretest, participants were assigned to two intervention groups and one control group; subsequently, the posttest was administered to all three groups, and finally, a follow-up assessment was conducted three months later. In this study, the research questionnaires were first administered to all children with hearing loss who referred to the audiology center. Thereafter, informed consent forms were completed, and based on the study inclusion criteria (including hearing thresholds between 40 and 70 dB, age range of 8–12 years,

E-ISSN: 3060-6713

consent to participate in the intervention, and active attendance in sessions), participants were selected as the study sample and then randomly assigned to two experimental groups and one control group (30 participants in the two experimental groups and 15 participants in the control group). Initially, a pretest was administered to all three groups; then, one experimental group received child-centered mindfulness training in 10 group sessions of 60 minutes each, while the other experimental group received drawing therapy training in 10 sessions of 45 minutes each. Finally, a posttest was administered to all three groups, and a follow-up phase was conducted for all groups after two months.

2.2. *Measures*

To assess behavioral problems, the Revised Behavior Problem Checklist for Children and Adolescents (RBPC) developed by Quay and Peterson was used. This questionnaire consists of 88 items and aims to assess behavioral problems in children and adolescents, including conduct disorder, attention problems–immaturity, social aggression, and anxiety–withdrawal. For scoring this questionnaire, three response options of 0, 1, and 2 are used, with total scores ranging from 0 to 176. In the study by Shahim et al. (2007), the validity of the Quay and Peterson questionnaire was established using item–total correlations, factor analysis, and correlations between questionnaire scores and scores on the Rutter Child Behavior Questionnaire (r = .88). The Children's Cognitive Assessment Questionnaire (CCAQ), developed by Shyer Zater and Lauri Chassin (1983), consists of 40 items and four subscales: negative appraisal (10 items), maladaptive thoughts (10 items), positive appraisal (10 items), and adaptive thoughts (10 items), and is used to assess cognitions related to test anxiety. This questionnaire examines test anxiety–related cognitions across four components: negative appraisal, maladaptive thoughts, positive appraisal, and adaptive thoughts. In the CCAQ, the subscales demonstrated moderate to good internal consistency based on Cronbach's alpha coefficients: positive appraisal = .74, negative appraisal = .82, adaptive thoughts = .67, and maladaptive thoughts = .72. Test–retest reliability correlations over a 6-week interval were .71 for positive appraisal, .69 for negative appraisal, .69 for adaptive thoughts, and .63 for maladaptive thoughts, which are considered reasonably strong over this extended period for a child measurement instrument.

2.3. *Intervention*

The child-centered mindfulness intervention was implemented based on the Bordick protocol (2017), adapted from the study by Hosseini and Manshaei (2018), and delivered over a three-month period in weekly group sessions lasting 60 minutes each. The protocol followed a structured, developmental sequence designed to cultivate mindfulness skills in children through experiential learning and age-appropriate exercises. Initial sessions focused on introducing the concept of mindfulness, establishing group rapport, and teaching foundational practices such as mindful postures and basic awareness of breathing. Subsequent sessions progressively emphasized awareness of the present moment, sensory experiences (sight, sound, touch, smell, and taste), thoughts, emotions, bodily sensations, and muscle tension through guided exercises, metaphors, games, and reflective writing tasks. Later sessions extended mindfulness practice to interpersonal relationships, daily activities, and academic tasks, fostering mindful engagement in everyday contexts. The final session integrated previously learned skills and introduced loving-kindness or compassion-focused meditation to enhance empathic awareness and self-compassion. Throughout the intervention, structured home assignments were provided to reinforce skill generalization beyond sessions.

The art therapy intervention was conducted according to Martin's educational art therapy package (2009) and delivered in 10 group sessions of 45 minutes each, with established content validity reported by Faramarzari (2013). This protocol utilized drawing and creative expression as therapeutic tools to facilitate emotional expression, self-awareness, cognitive engagement, and social interaction. Early sessions focused on warming up participants through simple drawing and coloring activities and familiarizing them with artistic media to stimulate creativity and imagery. Middle sessions emphasized concentration, memory, emotional expression, and self-concept by encouraging free-topic drawings, depiction of conflicting emotions, and exploration of personal meanings through art. Family relationships and interpersonal dynamics were addressed through family drawings, dyadic art activities, and group-based collaborative drawings, allowing group processes and relational patterns to emerge naturally. Later sessions incorporated structured symbolic tasks such as mandala creation to explore fears, boundaries, and self-regulation, followed by guided imagery and visualization-based drawing exercises aimed at accessing deeper cognitive and

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emotional experiences. Across all sessions, art-making served as a nonverbal medium to support insight, emotional processing, and adaptive coping within a supportive group environment.

2.4. Data Analysis

For data analysis, descriptive skewness and kurtosis tests were first used to determine the distribution of the data. Given the normal distribution of the data, to test the research hypotheses and compare the effects of the interventions on the dependent variables across repeated measurement stages (pretest, posttest, and follow-up), repeated-measures analysis of variance (ANOVA) was conducted using SPSS version 26.

3. Findings and Results

Table 1 presents the descriptive statistics for the main study variables, including behavioral problems and cognitive assessment components, across the three study groups (child-centered mindfulness, art therapy, and control) and three measurement occasions (pretest, posttest, and follow-up). Mean scores and standard deviations are reported to provide an overview of baseline equivalence, trends of change over time, and the general direction of intervention effects prior to inferential analyses.

Table 1

Descriptive Statistics (Mean ± SD) of Behavioral Problems and Cognitive Assessment Variables Across Groups and Measurement Times

Variable	Group	Pretest M (SD)	Posttest M (SD)	Follow-up M (SD)
Conduct Disorder	Mindfulness	42.73 (5.61)	39.18 (5.24)	39.02 (5.31)
	Art Therapy	41.89 (5.44)	40.21 (5.38)	40.17 (5.42)
	Control	42.11 (5.52)	41.88 (5.47)	41.95 (5.49)
Attention Problems–Immaturity	Mindfulness	45.26 (6.03)	42.14 (5.77)	42.08 (5.80)
	Art Therapy	44.92 (5.96)	43.70 (5.88)	43.65 (5.91)
	Control	45.11 (6.01)	44.98 (6.00)	45.02 (6.02)
Social Aggression	Mindfulness	38.44 (4.89)	33.61 (4.55)	33.58 (4.60)
	Art Therapy	37.91 (4.82)	35.27 (4.71)	35.31 (4.74)
	Control	38.02 (4.86)	37.88 (4.85)	37.94 (4.87)
Anxiety	Mindfulness	36.18 (4.57)	34.92 (4.46)	34.88 (4.49)
	Art Therapy	35.94 (4.51)	35.21 (4.48)	35.26 (4.50)
	Control	36.05 (4.54)	35.97 (4.55)	36.01 (4.56)
Negative Appraisal	Mindfulness	16.42 (2.91)	13.98 (2.74)	13.95 (2.76)
	Art Therapy	16.61 (2.88)	13.37 (2.69)	13.41 (2.71)
	Control	16.55 (2.90)	16.18 (2.87)	16.21 (2.89)
Maladaptive Thoughts	Mindfulness	17.88 (2.76)	14.94 (2.59)	14.97 (2.61)
	Art Therapy	18.02 (2.79)	14.71 (2.55)	14.75 (2.58)
	Control	17.95 (2.77)	17.68 (2.74)	17.71 (2.75)
Positive Appraisal	Mindfulness	13.41 (2.68)	15.82 (2.54)	15.79 (2.56)
	Art Therapy	13.58 (2.70)	15.20 (2.57)	15.24 (2.59)
	Control	13.47 (2.69)	13.71 (2.68)	13.69 (2.70)
Adaptive Thoughts	Mindfulness	14.06 (2.51)	16.98 (2.38)	17.01 (2.40)
	Art Therapy	14.21 (2.54)	17.48 (2.41)	17.45 (2.43)
	Control	14.12 (2.52)	14.39 (2.50)	14.41 (2.51)

As shown in Table 1, the three groups demonstrated comparable mean scores across all behavioral and cognitive variables at the pretest stage, indicating relative baseline equivalence. Over time, both intervention groups exhibited noticeable reductions in behavioral problem scores, particularly in conduct disorder, attention problems–immaturity, social aggression, and anxiety, whereas the control group showed minimal change across measurement occasions. The decline in social aggression was more pronounced in the child-centered mindfulness group than in the art therapy group and remained stable at follow-up. With respect to cognitive assessment variables, both intervention groups showed substantial decreases in negative appraisal and maladaptive thoughts from pretest to posttest, accompanied by increases in positive appraisal and adaptive thoughts, and these improvements were largely maintained at follow-up. In contrast, the control group displayed only minor fluctuations in cognitive scores across time. Overall, the descriptive findings suggest a general pattern of improvement in cognitive functioning for both intervention

E-ISSN: 3060-6713

groups and a more selective improvement in behavioral outcomes, providing preliminary support for the effectiveness of the child-centered mindfulness and art therapy interventions prior to inferential testing.

Prior to conducting the repeated-measures analysis of variance, the statistical assumptions underlying this test were examined. The normality of the distribution of the dependent variables at each measurement occasion was assessed using skewness and kurtosis indices, all of which fell within the acceptable range (±2), indicating approximate normal distributions. The absence of extreme outliers was verified through inspection of standardized scores and boxplots. Homogeneity of variances across groups was evaluated using Levene's test at the pretest stage and was found to be non-significant for all variables, supporting equality of error variances between groups. The assumption of sphericity for within-subject effects was examined using Mauchly's test; when violations were detected, Greenhouse–Geisser corrections were applied to adjust the degrees of freedom. Collectively, these diagnostics indicated that the assumptions required for repeated-measures ANOVA were adequately met, supporting the validity of the inferential analyses.

Table 2

Repeated-Measures Analysis of Variance (ANOVA) Results for Behavioral Problems and Cognitive Assessment Variables

Domain	Variable	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Behavioral Problems	Conduct Disorder	Time	670,913.252	1	670,913.252	17,851.476	.001
		Time × Group	189.259	2	94.630	2.518	.093
		Within-Group Error	1,578.489	42	37.583	—	—
	Attention Problems–Immaturity	Time	616,512.067	1	616,512.067	11,282.246	.001
		Time × Group	25.200	2	12.600	0.231	.795
		Within-Group Error	2,295.067	42	54.644	—	—
	Social Aggression	Time	695,096.067	1	695,096.067	20,554.033	.001
		Time × Group	449.244	2	224.622	6.642	.003
		Within-Group Error	1,420.356	42	33.818	—	—
	Anxiety	Time	581,741.067	1	581,741.067	18,325.454	.001
		Time × Group	25.644	2	12.822	0.404	.670
		Within-Group Error	1,333.289	42	31.745	—	—
Cognitive Assessment	Negative Appraisal	Time	240.100	1	240.100	73.429	.001
		Time × Group	132.067	2	66.033	20.195	.001
		Within-Group Error	137.333	42	3.270	—	—
	Maladaptive Thoughts	Time	352.044	1	352.044	122.738	.001
		Time × Group	159.489	2	79.744	27.802	.001
		Within-Group Error	120.467	42	2.868	—	—
	Positive Appraisal	Time	220.900	1	220.900	77.186	.001
		Time × Group	101.400	2	50.700	17.715	.001
		Within-Group Error	120.200	42	2.862	—	—
	Adaptive Thoughts	Time	196.544	1	196.544	109.578	.001
		Time × Group	105.622	2	52.811	29.443	.001
		Within-Group Error	75.333	42	1.794	—	—

As shown in Table 2, the results of the repeated-measures ANOVA indicate a significant main effect of time for all behavioral problem dimensions, including conduct disorder, attention problems–immaturity, social aggression, and anxiety ($p < .001$), reflecting overall changes across the measurement stages. However, the interaction effect of time and group was not statistically significant for conduct disorder, attention problems–immaturity, or anxiety ($p > .05$), suggesting that the pattern of change over time did not differ meaningfully between the intervention and control groups for these variables. In contrast, a significant time × group interaction was observed for social aggression ($F = 6.642$, $p = .003$), indicating differential intervention effects across groups over time. Regarding cognitive assessment variables, significant main effects of time were found for negative appraisal, maladaptive thoughts, positive appraisal, and adaptive thoughts ($p < .001$), demonstrating substantial temporal changes. Moreover, the interaction effects of time and group were statistically significant for all cognitive assessment subscales ($p < .001$), suggesting that the interventions produced distinct and differential effects on

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cognitive appraisal and thought patterns across the study groups over the pretest, posttest, and follow-up assessments.

Table 3

Post Hoc Pairwise Comparison Results (Tukey Test) for Behavioral Problems and Cognitive Assessment Variables

Domain	Component	Group Comparison (I–J)	Mean Difference (I–J)	Std. Error	Sig.
Behavioral Problems	Conduct Disorder	Control – Mindfulness	2.778	1.292	.112
		Control – Art Therapy	0.667	1.292	1.000
		Mindfulness – Art Therapy	−0.111	1.292	.330
	Attention Problems–Immaturity	Control – Mindfulness	−1.000	1.558	1.000
		Control – Art Therapy	0.200	1.558	1.000
		Mindfulness – Art Therapy	0.800	1.558	1.000
	Social Aggression	Control – Mindfulness	4.444	1.226	.002
		Control – Art Therapy	2.622	1.226	.115
		Mindfulness – Art Therapy	−1.822	1.226	.434
	Anxiety	Control – Mindfulness	0.788	1.188	1.000
		Control – Art Therapy	−0.244	1.188	1.000
		Mindfulness – Art Therapy	−1.022	1.188	1.000
Cognitive Assessment	Negative Appraisal	Control – Mindfulness	1.911	0.910	.125
		Control – Art Therapy	3.089	0.910	.005
		Mindfulness – Art Therapy	1.178	0.910	.608
	Maladaptive Thoughts	Control – Mindfulness	2.444	0.678	.002
		Control – Art Therapy	3.311	0.678	.001
		Mindfulness – Art Therapy	0.867	0.678	.624
	Positive Appraisal	Control – Mindfulness	−2.200	0.963	.083
		Control – Art Therapy	−1.622	0.963	.299
		Mindfulness – Art Therapy	0.578	0.963	1.000
	Adaptive Thoughts	Control – Mindfulness	−2.911	0.823	.003
		Control – Art Therapy	−3.267	0.823	.001
		Mindfulness – Art Therapy	−0.356	0.823	1.000

The post hoc Tukey test results presented in Table 3 indicate that, among behavioral problem components, a statistically significant difference was observed only for social aggression between the control group and the child-centered mindfulness group ($p = .002$), whereas no significant pairwise differences were found for conduct disorder, attention problems–immaturity, or anxiety across the groups ($p > .05$). Comparisons between the mindfulness and art therapy groups did not yield significant differences for any behavioral component. In contrast, for cognitive assessment variables, significant differences emerged primarily between the control group and the intervention groups. Specifically, the control group differed significantly from the art therapy group in negative appraisal ($p = .005$) and from both the mindfulness and art therapy groups in maladaptive thoughts ($p = .002$ and $p = .001$, respectively). Additionally, significant differences were observed between the control group and both intervention groups in adaptive thoughts ($p = .003$ for mindfulness and $p = .001$ for art therapy). No significant differences were found between the mindfulness and art therapy groups for any cognitive assessment subscale, nor were significant differences observed for positive appraisal across group comparisons, indicating comparable effects of the two interventions on positive cognitive evaluations.

4. Discussion

The present study aimed to compare the effectiveness of child-centered mindfulness training and drawing-based art therapy on behavioral problems and cognitive assessment in children with hearing impairment. The findings of the repeated-measures analyses demonstrated that, across time, significant changes occurred in most behavioral and cognitive variables, indicating that participation in structured interventions was associated with meaningful developmental and psychological shifts. However, the pattern and magnitude of these changes differed across outcome domains, providing important insights into the specific mechanisms and limits of each intervention.

With respect to behavioral problems, the results indicated a significant main effect of time for all behavioral dimensions, including conduct disorder, attention problems–

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immaturity, social aggression, and anxiety. This finding suggests that, irrespective of group assignment, behavioral indicators tended to change across the pretest, posttest, and follow-up assessments. Such time effects may reflect developmental maturation, increased familiarity with the assessment context, or the general influence of structured group engagement over time. Nevertheless, the critical indicator of intervention effectiveness—the interaction between time and group—was statistically significant only for social aggression. Post hoc comparisons revealed that the child-centered mindfulness group differed significantly from the control group in reducing social aggression, whereas the art therapy group did not differ significantly from either the control or the mindfulness group on this dimension. These findings imply that mindfulness training may exert a more targeted effect on interpersonal and externally expressed behavioral difficulties, particularly those related to impulsive or aggressive social responses.

This pattern aligns closely with prior research emphasizing the role of mindfulness in enhancing self-regulation, inhibitory control, and awareness of emotional impulses. Mindfulness-based practices encourage children to observe internal experiences without immediate reaction, which may be especially relevant for reducing aggressive responses in social interactions (Wong et al., 2024; Zaccari et al., 2022). In children with hearing impairment, difficulties in communication and social cue interpretation often contribute to frustration and reactive aggression (Paterson et al., 2020). By fostering present-moment awareness and nonjudgmental attention to bodily and emotional cues, child-centered mindfulness training may help these children pause before acting, thereby reducing socially aggressive behaviors (Heidari Darani & Manshi, 2022; Shahbazi et al., 2021). The absence of significant interaction effects for conduct disorder, attention problems, and anxiety suggests that these behavioral domains may be less sensitive to short-term mindfulness or art-based interventions or may require more intensive, multimodal approaches.

In contrast, the art therapy intervention did not demonstrate a distinct advantage over the control group in reducing behavioral problems, despite observable descriptive improvements. This finding is partially inconsistent with earlier studies reporting significant reductions in aggression and anxiety following drawing-based art therapy (Mardani et al., 2020; Rahimi Pardenjani et al., 2021). One plausible explanation lies in the heterogeneity of behavioral outcomes: while art therapy is effective in facilitating emotional expression and insight, its impact on overt behavioral regulation may depend on the explicit integration of behavioral skills training or parent-mediated components. Art therapy primarily operates through symbolic expression and emotional processing, which may influence internal states more directly than observable behavior in the short term (Miller, 2020; Rahna & Nithya, 2022). Consequently, behavioral change may emerge more gradually or require complementary behavioral reinforcement strategies.

The findings related to cognitive assessment variables were more robust and consistent across both interventions. Significant main effects of time and significant time-by-group interactions were observed for all cognitive subscales, including negative appraisal, maladaptive thoughts, positive appraisal, and adaptive thoughts. Post hoc analyses indicated that both the mindfulness and art therapy groups differed significantly from the control group on most cognitive dimensions, whereas no significant differences were found between the two intervention groups. These results suggest that both child-centered mindfulness training and drawing-based art therapy were effective in modifying cognitive appraisal patterns associated with anxiety and self-evaluation, and that their overall efficacy in this domain was comparable.

Specifically, both interventions were associated with reductions in negative appraisal and maladaptive thoughts and increases in adaptive thoughts, with these gains largely maintained at follow-up. These outcomes are theoretically consistent with cognitive models emphasizing the central role of appraisal processes in emotional and behavioral adjustment. Mindfulness interventions are posited to reduce maladaptive cognition by increasing metacognitive awareness and decentering from automatic negative thoughts, thereby weakening the impact of cognitive anxiety and self-critical evaluation (Amemiya & Sakairi, 2021; Carney et al., 2023). The present findings corroborate prior evidence demonstrating that mindfulness training improves cognitive flexibility, reduces fear of negative evaluation, and enhances self-acceptance in children and adolescents (Estadian Komar Aliya & Aghababa, 2022; Mansouri Nejad et al., 2021).

Similarly, the observed cognitive benefits of art therapy align with studies highlighting its effectiveness in restructuring emotional and cognitive representations through nonverbal symbolic processes. Drawing and expressive art activities allow children to externalize internal experiences, reinterpret emotionally charged situations, and

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develop more adaptive self-narratives (Feng & Bai, 2025; Qiu-Qiang et al., 2021). For children with hearing impairment, whose verbal cognitive processing may be constrained, art therapy offers an alternative pathway for cognitive integration and meaning-making (Mohammadi Kashka et al., 2022; Zeynali Dehrajabi & Ashouri, 2021). The lack of significant differences between mindfulness and art therapy on cognitive outcomes suggests that both approaches may converge on similar cognitive mechanisms, albeit through different experiential routes.

Notably, positive appraisal did not show significant pairwise differences across groups, despite significant overall time effects. This finding may indicate that enhancing positive cognitive evaluations requires longer intervention duration, stronger reinforcement, or broader contextual changes, such as family or school involvement. Previous research has suggested that while negative cognitions may be more readily reduced, the cultivation of stable positive appraisal and optimism often necessitates sustained practice and supportive environmental feedback (McKay & Benjamin, 2021; Ziaee et al., 2021). Therefore, the partial pattern of cognitive change observed in this study is consistent with existing theoretical and empirical work.

5. Conclusion

Taken together, the findings underscore the differential strengths of child-centered mindfulness training and drawing-based art therapy. Mindfulness appears to have a more pronounced impact on socially mediated behavioral problems, particularly aggression, whereas both interventions are similarly effective in improving maladaptive cognitive appraisal patterns. This distinction has important implications for intervention selection and tailoring. For children with hearing impairment who primarily exhibit externalizing social behaviors, mindfulness-based programs may offer particular benefits, whereas for those whose difficulties are more cognitively or emotionally internalized, either mindfulness or art therapy may be appropriate (Rahimi Pardenjani et al., 2021; Zaccari et al., 2022). The results also highlight the value of integrating experiential, nonverbal, and awareness-based approaches when working with populations facing communication barriers.

Despite its contributions, the present study has several limitations that should be acknowledged. First, the sample size was relatively small, which may have limited statistical power and reduced the ability to detect subtle between-group differences, particularly in behavioral outcomes. Second, participants were recruited from a single geographic location, which may restrict the generalizability of the findings to other cultural or educational contexts. Third, reliance on questionnaire-based measures introduces the possibility of response bias, especially given the involvement of children with sensory impairments. Finally, although a follow-up assessment was included, the follow-up period was relatively short, limiting conclusions about the long-term stability of intervention effects.

Future studies should consider employing larger and more diverse samples to enhance generalizability and statistical robustness. Longitudinal designs with extended follow-up periods would be valuable in determining the durability of behavioral and cognitive changes over time. Researchers may also explore integrative intervention models that combine mindfulness, art therapy, and behavioral skills training to address multiple domains simultaneously. In addition, incorporating multi-informant assessments, such as parent and teacher reports or observational measures, could provide a more comprehensive evaluation of intervention outcomes. Finally, qualitative approaches may offer deeper insight into children's subjective experiences of mindfulness and art-based interventions.

From a practical perspective, the findings suggest that both child-centered mindfulness training and drawing-based art therapy can be effectively implemented as supportive interventions for children with hearing impairment, particularly to improve cognitive appraisal and emotional processing. Practitioners should consider mindfulness-based programs when addressing social aggression and impulsive interpersonal behaviors, while art therapy may be especially useful for facilitating emotional expression and self-understanding. Schools, rehabilitation centers, and counseling services can integrate these interventions into routine support programs, ensuring that activities are developmentally appropriate and adapted to children's communication needs. Combining experiential interventions with family and school collaboration may further enhance their effectiveness and sustainability.

Authors' Contributions

K.A. conceptualized and designed the study, supervised the implementation of the interventions, and contributed to interpreting the findings. A.S.D. was responsible for data collection, coordination with participating centers, and

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administration of the assessment instruments. A.K. conducted the statistical analyses, interpreted the results, and contributed to drafting and critically revising the manuscript. All authors reviewed and approved the final version of the manuscript and take responsibility for the integrity and accuracy of the work.

Declaration

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

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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