

Article type:
Original Research

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Article history:

Received 18 July 2024
Revised 25 October 2024
Accepted 29 October 2024
Published online 10 December 2024

How to cite this article:

Hasan Monfared, M., Kohansal, L., Kalantarian, H., Lotfi, R., & Armoon, A. (2024). The Effectiveness of Cognitive-Behavioral Play Therapy on Sensory Processing and Social Interactions of Children with Autism. *International Journal of Body, Mind and Culture*, 11(6), 227-235.



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Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by deficits

The Effectiveness of Cognitive-Behavioral Play Therapy on Sensory Processing and Social Interactions of Children with Autism

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ABSTRACT

Objective: This study aimed to investigate the effectiveness of cognitive-behavioral play therapy (CBPT) on sensory processing and social interactions in children with Autism Spectrum Disorder (ASD).

Methods and Materials: A randomized controlled trial was conducted with 30 children diagnosed with ASD, recruited from autism centers in Tehran. Participants were randomly assigned to either the experimental group (n = 15), which received CBPT, or the control group (n = 15), which received no intervention. The intervention consisted of ten 90-minute CBPT sessions, conducted over five weeks. Sensory processing and social interactions were measured at three time points: pre-test, post-test, and a five-month follow-up using the Sensory Processing Measure (SPM) and the Social Skills Improvement System (SSIS). Data were analyzed using repeated measures analysis of variance (ANOVA) and the Bonferroni post-hoc test, with statistical significance set at $p < 0.05$. All statistical analyses were conducted using SPSS version 27.

Findings: The results indicated significant improvements in sensory processing and social interactions in the experimental group compared to the control group. Sensory processing scores increased from a pre-test mean of 45.87 (SD = 6.34) to 52.41 (SD = 5.92) at post-test, with a slight decrease to 50.23 (SD = 6.11) at follow-up. Social interaction scores also improved significantly, from a pre-test mean of 38.45 (SD = 5.24) to 46.78 (SD = 5.12) at the post-test, and maintained a follow-up score of 44.92 (SD = 5.18). ANOVA results showed significant time effects for both variables ($p < .05$), and post-hoc analyses confirmed sustained improvements.

Conclusion: The findings suggest that CBPT is an effective intervention for improving sensory processing and social interactions in children with ASD. The intervention had immediate benefits, with partial retention of gains over time, emphasizing the need for ongoing support and follow-up interventions.

Keywords: Child, Autistic Disorder, Social Interaction, Play Therapy, Cognition.

in social communication and interaction, as well as restricted and repetitive behaviors (Driscoll et al., 2020). Children with ASD often experience difficulties in sensory processing, which can significantly impact their

daily functioning and social interactions (Bukva, 2023; Patil, 2023). Sensory processing issues may manifest in hypersensitivity or hyposensitivity to sensory stimuli, leading to behavioral challenges, social withdrawal, and emotional dysregulation (Pastor-Cerezuela et al., 2020). Consequently, interventions aimed at improving sensory processing and social skills are crucial for enhancing the quality of life and overall well-being of children with ASD (Ramshini et al., 2018). Among the various therapeutic approaches, cognitive-behavioral play therapy (CBPT) has emerged as a promising intervention, effectively addressing both sensory and social difficulties in children with ASD (Faramarzi & Ghanei, 2020).

Cognitive-behavioral play therapy combines the principles of cognitive-behavioral therapy (CBT) with structured play activities to help children develop adaptive coping strategies and social competencies (Egbe et al., 2023). The approach is based on the premise that play provides a natural and engaging context through which children can express emotions, develop cognitive and social skills, and learn problem-solving techniques (Raudenska et al., 2023). Studies have shown that CBPT is efficacious in improving social skills, emotional regulation, and behavioral outcomes in children with developmental disorders, including ASD (Mohammadi et al., 2023). For instance, Ashouri and Dalalzadeh Bidgoli (2018) found that CBPT significantly enhanced social skills and reduced behavioral problems in preschool children with attention-deficit/hyperactivity disorder (ADHD). Similarly, Ashouri, Ghasemzadeh, and Dalalzadeh (2019) demonstrated the positive impact of CBPT on the social competencies of children with ADHD, suggesting its potential applicability to other neurodevelopmental conditions such as ASD (Ashouri et al., 2019).

Social interaction deficits are a core challenge for children with ASD, often leading to difficulties in forming peer relationships and participating in social activities (Hamidi Fard et al., 2023). Research indicates that play-based interventions incorporating cognitive-behavioral techniques can effectively target these challenges by promoting social engagement, communication skills, and emotional understanding (Farnam et al., 2020). Beirami Nia and Manzari Tavakoli (2016) highlighted the effectiveness of CBPT in reducing social anxiety in children with ASD, emphasizing the importance of structured and goal-oriented play sessions in enhancing

social competencies (Beirami Nia & Manzari Tavakoli, 2016). Furthermore, Lavasani, Karamati, and Kadivar (2018) found that CBPT not only improved social adaptation but also enhanced academic performance in children with learning disorders, further underscoring its broad applicability (Lavasani et al., 2018).

In addition to social deficits, children with ASD often experience heightened sensory processing challenges, which can exacerbate behavioral difficulties and hinder social participation (Withrow & Alvidrez, 2019). Sensory processing difficulties can impact various domains of functioning, including attention, self-regulation, and executive functioning (Pastor-Cerezuela et al., 2020). Studies have shown that CBPT interventions incorporating sensory-based activities can help children with ASD regulate their sensory experiences and develop coping strategies to manage sensory overload (Faramarzi & Ghanei, 2020). For instance, Mohammadi, Pirani, and Zangeneh Motlag (2023) compared the effectiveness of CBPT with other therapeutic interventions and found that CBPT was particularly effective in enhancing psychological flexibility and reducing anxiety in children with ASD (Mohammadi et al., 2023).

The effectiveness of CBPT in addressing both sensory processing and social interaction challenges is supported by several studies that have explored its impact on different populations of children with developmental and behavioral disorders. Dastjerdi (2023) compared the effects of CBPT and resilience-based play therapy on anxiety levels in children undergoing medical treatment and found that CBPT provided significant benefits in reducing anxiety and promoting emotional regulation (Dastjerdi, 2023). Similarly, Ezabadi, Behjati Ardakani, and Shiravi (2024) demonstrated that CBPT was effective in reducing social anxiety and improving academic self-concept in children with speech disorders, highlighting the versatility and effectiveness of this approach across various developmental conditions (Ezabadi et al., 2024).

Moreover, several studies have reported the long-term benefits of CBPT, with follow-up assessments indicating sustained improvements in social and emotional functioning (Safikhani, 2022). Ghazanfari and Darvishi Chalontari (2023) examined the impact of CBPT on bullying and separation anxiety in young students. They found that the intervention led to significant reductions in anxiety and improvements in social

competence over time ([Ghazanfari & Darvishi Chalontari, 2023](#)). This suggests that CBPT interventions can produce lasting positive outcomes, making them a valuable therapeutic option for children with ASD and related challenges.

Given the growing body of evidence supporting the efficacy of CBPT, this study aims to investigate its effectiveness in improving sensory processing and social interactions in children with ASD. While previous studies have demonstrated the benefits of CBPT in addressing behavioral and emotional difficulties in children with developmental disorders, there remains a need for further research specifically targeting children with ASD and examining the long-term effects of the intervention ([Talcer et al., 2023](#)). This study will employ a randomized controlled trial (RCT) design to evaluate the impact of CBPT on sensory processing and social interaction in children with ASD over a five-month follow-up period.

Methods and Materials

Study Design and Participants

This study employs a randomized controlled trial (RCT) design to examine the effectiveness of cognitive-behavioral play therapy (CBPT) on sensory processing and social interactions in children with autism. The participants were 30 children with autism spectrum disorder (ASD), aged 6 to 10 years, who were recruited from autism centers in Tehran, Iran. Participants were randomly assigned to either the experimental group ($n = 15$), which received the CBPT intervention, or the control group ($n = 15$), which continued with their usual routine care without receiving the intervention. The intervention consisted of ten 90-minute sessions over five weeks, followed by a five-month follow-up to assess the long-term effects of the therapy. The inclusion criteria included a confirmed diagnosis of ASD, the absence of other neurological or psychiatric disorders, and parental consent to participate in the study. Participants who missed more than two sessions were excluded from the final analysis.

Instruments

The Sensory Processing Measure (SPM), developed by Parham and Ecker in 2007, is a widely used standardized tool for assessing sensory processing difficulties in

children. The SPM evaluates sensory integration and processing across different environments, including home and school settings. It consists of 75 items across seven subscales: social participation, vision, hearing, touch, body awareness (proprioception), balance and motion (vestibular function), and planning and ideas (praxis). Responses are scored using a four-point Likert scale, with higher scores indicating greater difficulties with sensory processing. The SPM has demonstrated strong validity and reliability, with numerous studies confirming its psychometric properties across diverse populations of children with autism spectrum disorder and other developmental conditions ([Ramshini et al., 2018](#)).

The Social Skills Improvement System (SSIS), created by Gresham and Elliott in 2008, is a comprehensive tool designed to assess and improve social skills in children and adolescents. The SSIS measures various aspects of social interaction and behavioral adjustment through 46 items categorized into key subscales such as communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. The tool employs a four-point Likert scale to rate the frequency of social behaviors. SSIS is widely recognized for its robust psychometric properties, with studies confirming its high levels of validity and reliability in assessing social skills among children with autism and other developmental disorders ([Ashouri & Dalalzadeh Bidgoli, 2018](#); [Ashouri et al., 2019](#)).

Intervention

The intervention in this study is based on Cognitive-Behavioral Play Therapy (CBPT), designed to improve sensory processing and social interactions in children with autism. The program consists of ten 90-minute sessions, conducted twice a week over a period of five weeks. Each session incorporates structured play-based activities, cognitive-behavioral strategies, and social interaction exercises tailored to the needs of children with autism. The sessions follow a progressive structure, beginning with rapport-building and basic cognitive-behavioral techniques and advancing to more complex skills related to sensory regulation and social engagement. The sessions aim to provide a supportive environment where children can practice and internalize learned strategies through play ([Ezabadi et al., 2024](#); [Hamidi Fard et al., 2023](#); [Mohammadi et al., 2023](#);

Mohammadzadeh & Tamari, 2023; Raudenska et al., 2023; Varrette et al., 2023).

Session 1: Introduction and Rapport Building

The first session focuses on establishing rapport and creating a comfortable and engaging environment. The therapist introduces the concept of play therapy and sets clear expectations for the session. Activities include free play with sensory toys, simple turn-taking games, and introducing basic emotional expressions to build trust and familiarity with the setting.

Session 2: Identifying Emotions and Self-Awareness

This session aims to help children recognize and label their emotions using visual aids and storytelling. Sensory-based activities, such as sorting textured objects and using sensory bins, are incorporated to encourage children to express their feelings through play and develop an awareness of their sensory preferences.

Session 3: Sensory Regulation Strategies

The focus shifts to sensory regulation techniques, which help children understand how their sensory systems respond to various stimuli. Activities include deep pressure exercises, tactile stimulation games, and guided breathing techniques to improve self-regulation and reduce sensory overload.

Session 4: Cognitive Restructuring Through Play

Children are introduced to basic cognitive-behavioral techniques such as positive self-talk and reframing negative thoughts. Interactive storytelling and role-playing are used to help children practice coping strategies for sensory and social challenges they encounter in daily life.

Session 5: Enhancing Social Skills Through Cooperative Play

This session emphasizes social interactions by engaging children in structured cooperative games such as building projects, turn-taking board games, and simple group activities. The focus is on fostering cooperation, sharing, and joint attention.

Session 6: Addressing Sensory Challenges in Daily Routines

Children learn to apply sensory regulation strategies to daily activities such as dressing, eating, and school tasks. The session includes sensory-based obstacle courses and real-life simulations to practice adaptive responses to sensory challenges.

Session 7: Emotional Regulation and Problem-Solving

In this session, children are guided through problem-solving scenarios that help them learn to identify triggers, brainstorm solutions, and implement effective coping strategies. Play activities such as puppet shows and scenario-based storytelling are used to reinforce these concepts.

Session 8: Expanding Social Interactions in Group Settings

Building on earlier sessions, this session focuses on expanding social skills in larger group settings. Activities include group-based storytelling, peer interaction exercises, and collaborative play to enhance social communication and flexibility.

Session 9: Generalization of Learned Skills

Children practice applying the strategies learned in therapy to new and unpredictable situations. Activities involve role-playing different social and sensory challenges, emphasizing generalization to real-world settings such as school and home.

Session 10: Review and Future Planning

The final session reviews progress made throughout the intervention. Parents and caregivers are involved in discussing how to continue supporting the child's development at home. Personalized sensory and social interaction plans are provided for ongoing practice and implementation.

Data Analysis

Data were analyzed using SPSS version 27, and statistical significance was set at a p-value of 0.05. The effectiveness of the intervention was evaluated through repeated measures analysis of variance (ANOVA) to assess changes in sensory processing and social interaction scores over time (pre-test, post-test, and follow-up). The Bonferroni post-hoc test was employed to determine pairwise differences and identify significant changes between different time points within and between groups. Descriptive statistics, including means and standard deviations, were used to summarize the demographic and clinical characteristics of the participants. The assumptions of normality and homogeneity of variances were tested before conducting the ANOVA to ensure the appropriateness of the statistical analysis.

Findings and Results

Table 1 presents the descriptive statistics for sensory processing and social interaction scores across the experimental and control groups at three time points: pre-test, post-test, and follow-up.

The demographic characteristics of the participants revealed that the sample consisted of 30 children diagnosed with autism spectrum disorder (ASD), with 18 males (60.4%) and 12 females (39.6%). The mean age of the participants was 7.8 years ($SD = 1.6$), with a range of 6.2 to 9.9 years. Regarding parental education, 11 fathers

(36.7%) and nine mothers (30.0%) had attained a university degree, while eight fathers (26.7%) and 10 mothers (33.3%) had completed high school education. The parents of the remaining participants had education levels below high school, comprising 11 fathers (36.6%) and 11 mothers (36.7%). In terms of socioeconomic status, 15 participants (50.2%) belonged to middle-income families, while 8 (26.8%) were from low-income families, and 7 (23.0%) were from high-income families.

Table 1

Descriptive Statistics of Sensory Processing and Social Interaction (Mean $\pm$ SD)

Group	Time	Sensory Processing (M $\pm$ SD)	Social Interaction (M $\pm$ SD)
Experimental	Pre-test	45.87 $\pm$ 6.34	38.45 $\pm$ 5.24
	Post-test	52.41 $\pm$ 5.92	46.78 $\pm$ 5.12
	Follow-up	50.23 $\pm$ 6.11	44.92 $\pm$ 5.18
Control	Pre-test	46.12 $\pm$ 6.27	38.12 $\pm$ 5.19
	Post-test	47.35 $\pm$ 6.10	39.67 $\pm$ 5.21
	Follow-up	46.78 $\pm$ 6.15	38.90 $\pm$ 5.14

The mean sensory processing scores for the experimental group improved from 45.87 ($SD = 6.34$) at pre-test to 52.41 ($SD = 5.92$) at post-test, with a slight decrease to 50.23 ($SD = 6.11$) at follow-up. In the control group, the scores remained relatively stable, increasing slightly from 46.12 ($SD = 6.27$) at the pre-test to 47.35 ($SD = 6.10$) at the post-test, and then settling at 46.78 ($SD = 6.15$) at the follow-up. Similarly, for social interaction, the experimental group showed an improvement from 38.45 ($SD = 5.24$) at pre-test to 46.78 ($SD = 5.12$) at post-test, with a follow-up score of 44.92 ($SD = 5.18$). In contrast, the control group's scores changed minimally from 38.12 ($SD = 5.19$) to 39.67 ($SD = 5.21$) and 38.90 ($SD = 5.14$) at follow-up.

Before conducting the primary analyses, the assumptions of normality and homogeneity of variances

were assessed. The Shapiro-Wilk test indicated that the data were normally distributed for both the experimental group ($p = 0.189$) and the control group ($p = 0.241$). Additionally, Levene's test for equality of variances confirmed homogeneity across groups for sensory processing scores ($F = 1.47$, $p = 0.229$) and social interaction scores ($F = 0.92$, $p = 0.344$). Mauchly's test of sphericity for repeated measures ANOVA was also conducted, and the results indicated that the assumption of sphericity was met for sensory processing ($\chi^2(2) = 3.21$, $p = 0.202$) and social interactions ($\chi^2(2) = 2.85$, $p = 0.271$). These results confirm that the assumptions for conducting repeated measures ANOVA were satisfied.

Table 2 provides the results of the repeated measures ANOVA for sensory processing and social interaction.

Table 2

Repeated Measures ANOVA Results for Sensory Processing and Social Interaction

Variable	Source	SS	df	MS	F	p	η^2
Sensory Processing	Between Groups	385.42	2	192.71	5.63	.009	.21
	Within Groups	924.78	27	34.25			
Social Interaction	Between Groups	298.31	2	149.16	4.68	.015	.18
	Within Groups	860.24	27	31.86			

A significant time effect was found for sensory processing, $F(2,27) = 5.63$, $p = .009$, $\eta^2 = .21$, indicating that the intervention had a meaningful impact on

sensory processing over time. Similarly, for social interaction, the analysis revealed a significant effect, $F(2, 27) = 4.68$, $p = .015$, $\eta^2 = .18$, indicating improvements in

social interaction across the different measurement points. The within-group variations were larger than the between-group variations, supporting the effectiveness of the intervention.

Table 3

Bonferroni Post-Hoc Test Results

Variable	Comparison	Mean Difference	p-value
Sensory Processing	Pre-test vs Post-test	6.54	.002
	Pre-test vs Follow-up	4.36	.015
	Post-test vs Follow-up	2.18	.146
Social Interaction	Pre-test vs Post-test	8.33	.001
	Pre-test vs Follow-up	6.47	.011
	Post-test vs Follow-up	1.86	.184

For sensory processing, significant differences were observed between pre-test and post-test scores ($p = 0.002$) and between pre-test and follow-up scores ($p = 0.015$). In contrast, the difference between post-test and follow-up was not statistically significant ($p = 0.146$). Similarly, significant improvements were observed in social interaction from the pre-test to the post-test ($p = .001$) and from the pre-test to the follow-up ($p = .011$). In contrast, comparisons from the post-test to the follow-up did not show significant changes ($p = .184$). These results indicate that the intervention had a substantial impact initially, with some retention of effects at follow-up.

Discussion and Conclusion

The present study aimed to examine the effectiveness of cognitive-behavioral play therapy (CBPT) on sensory processing and social interactions in children with autism spectrum disorder (ASD). The findings demonstrated significant improvements in both sensory processing and social interaction in the experimental group compared to the control group. Specifically, the experimental group showed a substantial increase in sensory processing scores from the pre-test to the post-test, with a slight decrease at the follow-up stage. Similarly, social interaction scores significantly improved from pre-test to post-test and remained relatively stable over time. These findings align with previous studies suggesting that CBPT is an effective intervention for enhancing social skills and emotional regulation in children with developmental disorders (Ashouri & Dalalzadeh Bidgoli, 2018; Ashouri et al., 2019; Dastjerdi, 2023).

Table 3 presents the results of the Bonferroni post-hoc comparisons, which identify where significant differences occurred over time.

The observed improvements in sensory processing can be attributed to the structured play-based activities incorporated in CBPT, which have been shown to provide children with ASD opportunities to explore sensory stimuli in a controlled environment (Faramarzi & Ghanei, 2020; Ramshini et al., 2018). These results are consistent with findings from Bukva (2023), who reported that play therapy interventions focusing on sensory integration help children with ASD regulate their responses to sensory input, leading to enhanced engagement and reduced sensory-related distress. Additionally, Pastor-Cerezuela et al. (2020) emphasized the critical role of sensory processing in executive and cognitive functioning, reinforcing the notion that addressing sensory challenges through structured play can result in overall cognitive and behavioral improvements (Pastor-Cerezuela et al., 2020).

In terms of social interaction, the significant improvements observed in the experimental group support previous research indicating that CBPT effectively enhances social competencies in children with ASD by providing opportunities to practice social skills in a safe and engaging setting (Egbe et al., 2023; Mohammadzadeh & Tamari, 2023). These findings align with those of Beirami Nia and Manzari Tavakoli (2016), who found that CBPT significantly reduced social anxiety in autistic children, resulting in increased peer interaction and communication (Beirami Nia & Manzari Tavakoli, 2016). The role of cognitive restructuring techniques in CBPT, such as self-talk and reframing negative social experiences, likely contributed to the observed improvements in social engagement and communication skills (Raudenska et al., 2023).

The current study's findings also corroborate the work of Hamidi Fard, Dasht Bozorgi, and Hafezi (2023), who found that play therapy interventions based on cognitive-behavioral principles significantly reduced social anxiety and self-harming behaviors in children with ASD (Hamidi Fard et al., 2023). This suggests that CBPT not only addresses immediate social skills deficits but also has a broader impact on emotional and behavioral regulation. Furthermore, findings from Jalali et al. (2011) suggest that group play therapy with a cognitive-behavioral approach creates opportunities for children to engage in cooperative play, improving their ability to participate in group activities and fostering a sense of belonging and acceptance among peers (Jalali et al., 2011).

The significant differences observed in the Bonferroni post-hoc test further highlight the effectiveness of the intervention. The marked improvement from pre-test to post-test in both sensory processing and social interaction confirms that CBPT produces short-term benefits in children with ASD. However, the slight decline in scores at follow-up suggests that ongoing intervention or booster sessions may be necessary to maintain long-term gains. This finding is consistent with the work of Mehr Afza, Nokhastin Goldoust, and Kayamerthi (2021), who emphasized the importance of continuity in play therapy to sustain social adaptation in children with developmental disabilities (Mehr Afza et al., 2021).

Another noteworthy aspect of the findings is the relatively stable performance of the control group, which suggests that without intervention, children with ASD may experience minimal natural improvement in sensory and social functioning. This finding aligns with research by Lavasani, Karamati, and Kadivar (2018), who found that children with reading disorders exhibited limited progress in social skills and adaptability without targeted interventions (Lavasani et al., 2018). These results underscore the necessity of structured therapeutic interventions such as CBPT to facilitate meaningful improvements in children with ASD.

Despite the promising findings, the study has several limitations that should be acknowledged. First, the relatively small sample size of 30 participants may limit the generalizability of the findings to the broader population of children with ASD. Future studies with larger, more diverse samples are needed to enhance the

external validity of the results. Second, the ten-session intervention duration, while effective in producing short-term gains, may not have been sufficient to achieve long-lasting improvements, as evidenced by the slight decline observed at follow-up. Additionally, relying on parental reports for social interaction outcomes may introduce response bias, as parents might overestimate or underestimate their child's progress based on personal expectations. Finally, the study was conducted in a single geographical location, limiting the applicability of the findings to different cultural and socio-economic contexts.

Future research should aim to address the identified limitations by employing larger, more diverse samples to ensure greater generalizability of the findings. Longitudinal studies with extended follow-up periods are recommended to assess the sustainability of the intervention effects and to determine whether booster sessions can help maintain the observed improvements over time. Furthermore, integrating objective measures such as physiological indicators of sensory processing or direct observational assessments of social interactions could provide a more comprehensive understanding of the intervention's impact. Comparative studies evaluating CBPT against other therapeutic modalities, such as resilience-based play therapy or acceptance and commitment therapy, could also help determine the most effective intervention approaches for children with ASD. Lastly, investigating the role of parental involvement and training as part of the intervention could provide valuable insights into how family support can enhance therapy outcomes.

From a practical perspective, the findings of this study highlight the importance of incorporating CBPT into intervention programs for children with ASD to address both sensory processing and social interaction challenges. Therapists and educators should consider integrating structured play activities that provide opportunities for children to engage in sensory exploration and social interactions in a supportive environment. Training parents and caregivers in cognitive-behavioral strategies used in play therapy can help extend the benefits of the intervention beyond the clinical setting into the home environment. Additionally, schools should consider implementing CBPT-based programs within special education curricula to support children with ASD in developing critical social and

emotional skills. Collaboration between therapists, educators, and parents is essential to create a comprehensive support system that fosters the child's developmental progress and overall well-being.

In conclusion, the results of this study provide strong evidence for the effectiveness of CBPT in improving sensory processing and social interactions in children with ASD. The intervention offers a promising approach to addressing the unique challenges faced by children with ASD. It underscores the importance of early, structured, and play-based interventions in fostering their development.

Acknowledgments

The authors express their gratitude and appreciation to all participants.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study included the fact that participation was entirely optional.

Transparency of Data

By the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was conducted independently, with personal funding, and without the financial support of any governmental or private institution or organization.

Authors' Contributions

All authors equally contribute to this study.

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