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Original Article

Effects of Developmental, Individual-Differences, Relationship-Based (DIR) / Floortime™ on Social Skills and Social Adjustment of Children with Mild Autism Spectrum Disorder

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ABSTRACT

Background: This study investigates the effects of DIR/Floortime™ on the social skills and social adjustment of children with mild autism spectrum disorder (ASD). The aim is to evaluate whether training in Floortime™ significantly enhances the social capabilities and adjustment of children with autism spectrum disorder.

Methods: A quasi-experimental design was employed. Data were gathered using the Gresham and Elliott Social Skills Scale and Bell's Social Adjustment Inventory. Participants included 30 children diagnosed with mild ASD and their families, who participated in eight Floortime™ intervention sessions.

Results: The results indicated significant improvements in social communication and emotional regulation among the children. Parents reported enhanced parent-child interactions and increased engagement in daily activities, highlighting the intervention's positive impact on family dynamics. Statistical analyses also demonstrated meaningful improvements in children's ability to initiate joint attention and respond to social cues, both of which are vital for effective communication.

Conclusion: Family-oriented DIR/Floortime™ is an effective intervention for enhancing the social skills and social adjustment of children with mild ASD. The study emphasizes the importance of parental involvement and individualized interventions in supporting child development. Future research is recommended to explore the long-term effects of Floortime™ on social functioning across diverse settings.

Introduction

Parents' awareness of their children's unique challenges can often transform their hopes into frustration or disappointment, leading to various psychosocial and emotional issues [1]. One such challenge is raising a child with autism spectrum disorder (ASD), a condition that significantly affects communication and social interaction. The wide variability in symptoms among affected individuals has led to ASD being classified as a spectrum disorder in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) [2]. This disorder

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has a profound impact on overall health and well-being [3].

Early diagnosis of ASD is crucial, as timely interventions are associated with more favorable developmental and social outcomes. ASD is a lifelong condition that presents considerable challenges not only for affected individuals but also for their families, educational institutions, and social support systems [4].

Evidence indicates that individuals with high-functioning ASD exhibit significant difficulties in social-emotional interactions and pronounced impairments in social cognition [4]. These cognitive and social deficits affect daily functioning in multiple ways, including difficulties recognizing emotional states and moods, limited social engagement, and difficulties communicating effectively or establishing and maintaining positive interpersonal relationships [5].

Although there is currently no definitive cure for ASD, a range of medical, rehabilitative, and psychological interventions has demonstrated efficacy in reducing the daily challenges experienced by affected children. These approaches can play a vital role in improving the overall quality of life for individuals with ASD [6]. Over the past few decades, therapeutic methods such as play therapy and drama therapy have been increasingly employed to mitigate the severity of clinical symptoms while simultaneously promoting social interaction skills and engagement among children and adolescents with ASD [7].

Among the various interventions employed in clinical settings, play-based approaches are particularly valued for their capacity to meaningfully engage children and align with their interests. A systematic review by Dijkstra-de Neijs et al. analyzed 32 randomized controlled trials (RCTs) and reported significant improvements in social interaction, communication, daily functioning, and play behavior among participants [8].

Additionally, Casenhiser et al. conducted an RCT with 51 children aged 2 to 5 years to evaluate the effectiveness of a social-communication-based intervention on the social interaction skills of children with ASD. The findings indicated that children in the treatment group demonstrated significantly greater improvements in social interaction compared to those receiving community-based treatment. Notably, the initiation of joint attention, levels of involvement, and the severity of language delays were significantly correlated with gains in language skills among children with ASD. Furthermore, the intervention effectively enhanced caregiver skills, which were significantly associated with improvements in the children's interaction abilities [9].

In another systematic review, Divya et al. (2023) highlighted substantial improvements across multiple domains of functioning in children with autism who participated in DIR/Floortime™ interventions. This home-based approach not only enhanced emotional functioning, communication, and daily living skills but also promoted more positive parent-child interactions, as reported by mothers. Additionally, certain parental demographic factors were found to significantly influence the outcomes of Floortime™. Importantly, no adverse events were observed among children or parents during the intervention [10].

Developmental, Individual-differences, Relationship-based therapy (DIR), delivered via Floortime™ or DIR/Floortime™, is a developmental model specifically designed for children with ASD that emphasizes enhancing social communication skills through play-based, child-led interactions. This approach is grounded in a holistic understanding of child development, recognizing that growth occurs across multiple interconnected domains—including social, emotional, cognitive, and motor skills—and that each child's unique individual differences play a critical role in shaping their developmental trajectory [10, 11].

A central tenet of DIR is that the parent–child relationship is the primary context for learning and development. This relationship-based perspective emphasizes that emotionally attuned interactions during play promote the development of self-regulation, problem-solving, and social competence. Within this framework, play is not merely an activity but a dynamic process in which children and caregivers explore emotions, share experiences, and co-construct meaning, thereby fostering adaptive responses across diverse social contexts [10, 11].

Moreover, the theoretical foundations of DIR suggest that engaging in responsive and emotionally supportive interactions enables children to manage their behavior and internal experiences while developing the capacity for reciprocal social engagement. DIR/Floortime™ employs structured yet flexible play techniques to encourage spontaneous expression in the child and to scaffold developmental skills under the guidance of the caregiver. This intervention aims to produce measurable improvements not only in observable social behaviors but also in broader domains of adaptive functioning, including emotion regulation and social problem-solving. By integrating principles from developmental psychology and attachment theory, DIR/Floortime™ creates an environment in which the child's emerging abilities can flourish through collaborative, individualized, and relationship-focused strategies [10, 11].

A review of the existing literature reveals a paucity of direct studies examining the effects of family-based Floortime™ on the social skills and social adaptation of children with ASD, highlighting a clear research gap. Accordingly, the present study aims to evaluate the effectiveness of family-oriented Floortime™ in enhancing social skills and social adaptation in children with mild ASD, specifically investigating whether participation in Floortime™ training produces measurable improvements in these domains.

Methods

Participants

In this quasi-experimental study, the sample comprised 34 preschool students aged 5 to 6 years who had been diagnosed with mild ASD and were enrolled in a specialized ASD center. Participants were selected

using a convenience sampling method, and each had a confirmed diagnosis of mild ASD by a pediatric psychiatrist affiliated with the center. The severity of ASD was assessed using the Autism Diagnostic Observation Schedule (ADOS) and the Childhood Autism Rating Scale, Second Edition (CARS-2) [12, 13]. Among the initial participants, two were excluded for lack of willingness to continue, one for a seizure, and one for undergoing kidney surgery (Fig. 1) .

The inclusion criteria were as follows: (1) Age between 5 and 6 years, (2) Minimal interpersonal communication skills, (3) Limited speech ability, (4) Ablility to follow instructions, (5) No history of seizures, (6) Absence of physical disorders or comorbidities, such as hearing or visual impairments, (7) Confirmed diagnosis of mild ASD, verified using standardized diagnostic instruments, and (8) Parental consent and active participation in the study.

Exclusion criteria included: (1) Withdrawal or lack of cooperation during the study, (2) Occurrence of seizures, or (3) Any injury, medical condition, or disorder that would prevent continued participation.

Procedure

Ethical approval was obtained from the Research Ethics Committee of Islamic Azad University (Code of Ethics: IR.IAU.TMU.REC.1403.184). Participants were recruited in Karaj, Iran, during the 2023–2024 academic year. Recruitment was conducted through direct contact with ASD-specific centers in Karaj. After parents completed and signed the written informed consent forms, participants were enrolled in the study.

Thirty participants were randomly assigned to either the intervention or control group, with 15 children in each group. Before the intervention, a baseline assessment was conducted for all participants. The intervention group then participated in eight DIR/Floortime™ sessions, each lasting 90 minutes and conducted weekly, while the control group received no intervention. Following completion of the intervention period, a post-intervention assessment was carried out.

Given the limited evidence on the optimal number of intervention sessions, the number of sessions in the present study was determined based on the average reported in previous studies [9, 11, 19], which typically ranged from 6 to 10 sessions. This decision was also made with consideration of participant feasibility and convenience (Table 1).

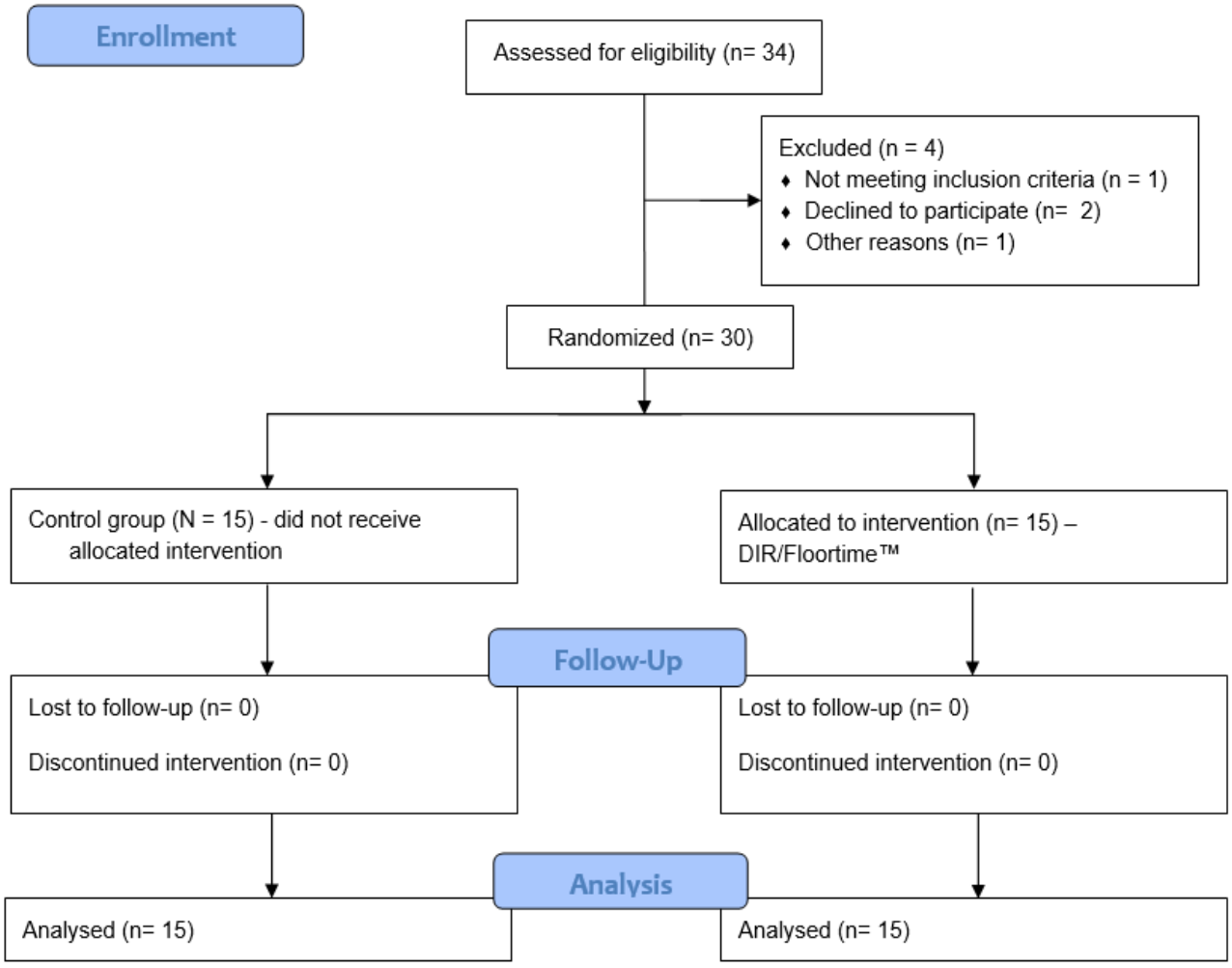

Figure 1: Consort flow diagram
from Moreira Falci & Marques (2015) [29]

Measures

Gresham and Elliott Social Skills Scale – Teacher's Form: This scale comprises 48 items designed to assess three subscales related to children's social skills: cooperation, assertiveness, and self-control. It is available in three forms—parent, teacher, and student—allowing for independent or combined assessments [14]. In the present study, the teacher's form was utilized, as teachers are valuable sources of information regarding students' behaviors and competencies in educational settings [14].

Teachers completed the 48-item questionnaire, which uses a three-point Likert scale with response options of "never," "sometimes," and "often." The instrument consists of two primary domains: social skills and behavioral problems [15]. The social skills domain includes cooperation, assertiveness, and self-control, whereas the behavioral problems domain encompasses internalizing behaviors, externalizing behaviors, and hyperactivity [13]. This structure yields two composite scores—one for social skills and one for behavioral problems—calculated by summing the corresponding item scores. The internal consistency reliability of the teacher's form has been reported to range from 0.74 to 0.95 [15].

Bell's Adjustment Inventory (BAI): Bell's Adjustment Inventory consists of five domains: home adjustment, health adjustment, emotional adjustment, and social adjustment. The questionnaire includes 32 items with response options of "yes," "no," and "I don't know." In the social adjustment domain, higher scores indicate poorer adjustment (greater maladjustment), whereas lower scores reflect better social adaptation. A response of "yes" is scored as 1 point, while "no" is scored as 0 points [16].

Data analysis

SPSS version 22 was used for data analysis, with the statistical significance level set at 0.05. To compare mean scores across different stages, one-way analysis of covariance (ANCOVA) was performed.

Before conducting ANCOVA, three primary assumptions were examined: (1) homogeneity of regression slopes, (2) homogeneity of variances, and (3) normality of the variables [17]. To evaluate these assumptions, the homogeneity of regression slopes test, Levene's test, and the Kolmogorov–Smirnov test were applied, respectively.

social skills of children with mild ASD.

The effect size, measured using Eta-squared (η^2), was 0.794, indicating that approximately 79.4% of the variance in post-test social skills scores was attributable to the intervention. This represents a large effect size and highlights the substantial effectiveness of the DIR/Floortime™ approach in improving social skills. [Table 3]

Results

Demographic Characteristics of the Participants

Thirty children with mild ASD (18 boys and 12 girls; age range: 5–8 years) participated in this study. The demographic characteristics of the participants are presented in Table 2. [Table 2]

The results of the Kolmogorov–Smirnov test indicated that all variables were normally distributed ($p > 0.05$). Therefore, parametric statistical analyses, including ANCOVA, were conducted.

The Effect of DIR/Floortime™ on Social Skills of Children with Mild ASD

Before conducting ANCOVA, the assumptions were examined. The homogeneity of regression slopes was assessed by testing the interaction between group (DIR/Floortime™) and the covariate. The interaction effect was not statistically significant ($F = 2.563$, $p > 0.05$), indicating that the assumption of homogeneity of regression slopes was satisfied.

Levene's test was conducted to assess the homogeneity of variances, and the results were not statistically significant ($F = 1.477$, $p > 0.05$), confirming equality of variances across groups.

The ANCOVA results (Table 3) revealed a statistically significant difference between the intervention and control groups in post-test social skills scores after controlling for pre-test scores ($df = 1$, $p < 0.05$). This finding indicates that the DIR/Floortime™ intervention had a significant positive effect on the

The Effect of DIR/Floortime™ on Social Adjustment of Children with Mild ASD

To examine the effect of DIR/Floortime™ on social adjustment, ANCOVA was performed after verifying the statistical assumptions. The interaction between group and covariate was not statistically significant ($F = 15.166$, $p > 0.05$). confirming the assumption of homogeneity of regression slopes.

Levene's test for equality of variances was also non-significant ($F = 0.640$, $p > 0.05$), supporting the homogeneity of variances assumption.

The ANCOVA results (Table 4) demonstrated a statistically significant difference between the intervention and control groups in post-test social adjustment scores after adjusting for pre-test scores ($df = 1$, $p = 0.005$).

The effect size ($\eta^2 = 0.893$) indicated that approximately 89.3% of the variance in social adjustment outcomes was explained by the intervention. This very large effect size suggests that DIR/Floortime™ had a strong positive impact on improving social adjustment among children with mild ASD. (Table 4)

Table 1: Content of Sessions of DIR-Floortime™

Session	Content
1	Initial conversation with the parents to establish an appropriate relationship with the families and the client about the importance of childhood and the disadvantages that will occur to children due to low social skills in the future.
2	Examining the individual characteristics of children with an emphasis on considering individual differences and guiding mothers on how to react to these differences.
3	Investigating the importance of childhood, learning about the development of children and their developmental stages, the effects of this period in the future, and the necessity of trying to improve the performance of parents in this period.
4	DIR/Floortime™ training
5	
6	Practice DIR/Floortime™ between mother and child in a clinical setting or at home, recommending specific plays to each parent and
7	monitoring their quality.
8	Practice and taking videos of the plays, observing the mother and child play examining the effect of the DIR/Floortime™ from the point of view of mothers, and answering their questions in this field.

Table 2: Demographic characteristics of participants

Variables	Total	DIR-Floortime™	Control group
Participants	30	15	15
Mean age (SD)	6.31 (9.0)	6.02 (0.87)	6.3 (0.6)
% Male	60	60	60

Table 3: ANCOVA analysis of effect of DIR/Floortime™ on social skills of the participants

Source of variation	Sum of squares	df	Mean square	F	P-value	Eta square
Pre-test	2.086	1	2.086	3.149	0.018	0.794
Control group	5.094	3	1.698	2.563	0.293	-
Error	1.325	2	0.662	-	-	-

Table 4: ANCOVA analysis of effect of DIR/Floortime™ on social adjusment of the participants

Source of variation	Sum of squares	df	Mean square	F	P-value	Eta square
Pre-test	268.356	1	268.356	134.178	0.005	0.893
Control group	20.554	2	30.332	15.166	0.179	-
Error	2	1	2	-	-	-

Discussion

The findings of the present study indicate that DIR/Floortime™ training is effective in improving the social skills of children diagnosed with mild autism spectrum disorder (ASD). These results are consistent with a growing body of literature supporting the efficacy of DIR/Floortime™ in enhancing social communication, emotional regulation, and parent–child relationships. Previous studies have reported significant improvements in social skills and adaptive behaviors among children with ASD following DIR/Floortime™ interventions [18, 19]. Our findings, which reveal significant advancements in children's social adjustment, align with these studies, reinforcing the evidence that even brief, relationship-based interventions can yield measurable benefits [20]. Furthermore, research has demonstrated that improvements in parental responsiveness and reductions in caregiver stress contribute to enhanced social functioning in children.

The effectiveness of DIR/Floortime™ stems from its distinctive focus on the dynamic relationship between structured play activities and spontaneous, emotionally attuned interactions. This intervention seeks to foster both the child's initiative and parental sensitivity, thereby creating a secure environment in which the child can practice and enhance social communication skills. This dual emphasis supports the development of shared attention, reciprocal communication, and problem-solving abilities—all crucial domains often affected in children with ASD [19]. Additionally, specific techniques, such as systematic desensitization and cognitive reframing, are employed to modify maladaptive behavioral patterns and to gradually reinforce positive interactions. These strategies not only promote immediate improvements during sessions but also facilitate sustained changes in the parent–child dynamic, encouraging the generalization of social skills to daily life contexts [21].

The participating mothers predominantly reported elevated levels of stress associated with the challenges of interacting with their children. This heightened stress adversely affected their parenting approaches and strategies. Key factors contributing to maternal stress included the children's behavioral and communication difficulties, mothers' anxiety regarding their child's delayed social development, societal and familial rejection of the child's inappropriate social behaviors, and reduced maternal self-efficacy in managing these challenges [18].

Over time, this chronic stress associated with the child's communication and social difficulties may become entrenched. Elevated stress levels combined with low self-efficacy may predispose mothers to adopt rigid, punitive, and even aggressive parenting approaches [19]. Additionally, mothers may be less likely to engage consistently in training programs designed to enhance their parenting skills, thereby reducing their effectiveness in identifying and implementing appropriate strategies to address their children's needs [20]. These dynamics can negatively affect the child's development and significantly hinder the formation of positive social relationships [20].

In this study, in addition to enhancing the mother's psychological well-being and her interactions with the child, emphasis was placed on reinforcing socially desirable behaviors and indirectly teaching social skills

to the children. Since the training occurs within the context of the child's relationship with the primary caregiver, the skills acquired can be effectively generalized and applied within the home and broader family environment.

Another notable effect of the DIR/Floortime™ approach is its influence on parents' attitudes toward their children's social challenges. Throughout the developmental process, parents are guided to support their children in enhancing social skills through educational and therapeutic interventions. They learn to manage and reduce challenging behaviors, adopt a more positive perspective on their child's progress, and place less pressure on the child to meet specific social expectations [21]. Evidence indicates that children perform significantly better when encouraged to engage in behaviors that lead to positive outcomes, rather than being coerced or threatened by parents [22]. Consistent with these expectations, the results of this study demonstrate that joint participation by mothers and children in DIR/Floortime™ led to improvements in children's social skills.

Furthermore, the findings of this study indicate that the mother's involvement in the therapeutic process promotes interactions grounded in DIR principles within a supportive, child-centered environment. This setting enables the child to express both positive and negative emotions freely, without experiencing guilt. Such an environment not only fosters the development of the child's social skills but also strengthens the parent-child relationship [23, 24].

Mothers who participate in DIR/Floortime™ demonstrate an enhanced ability to accept their child's behaviors, adopt a more optimistic perspective regarding their child's social skill development, and consequently reduce many of the anxieties and stresses associated with their child's social growth.

The results also reveal that the social adjustment of participants who received DIR/Floortime™ was significantly higher than that of the control group.

One notable characteristic of children with mild ASD is their limited interest in and emotional responsiveness to those around them [25]. DIR/Floortime™ comprises a series of structured, purposeful activities while also allowing the child the freedom to engage in unstructured, spontaneous play. This approach is guided by a problem-focused, short-term framework, fostering a therapeutic relationship characterized by cooperation, trust, and rapport between the therapist and the child [24]. The therapist's role is to teach new skills and encourage development by attending to the child's thoughts, feelings, fantasies, and environment while employing adaptive strategies [26].

The behavioral techniques used in DIR/Floortime™ include systematic desensitization, dependency management, autonomy promotion, and activity planning. Cognitive techniques involve thought recording, cognitive restructuring strategies to manage inner speech, modeling, role-playing, and additional methods for managing dependency [27].

The cross-sectional design of the current study imposes certain limitations on our understanding of social skills and adjustment in children. Specifically, this design may not fully capture the dynamic influences of various factors, including formal and informal social support, extended family dynamics, and individual personality traits.

A primary limitation of this study is the relatively small sample size of 30 participants. This limited number may affect the generalizability of the findings, as the results may not represent the broader population of children with mild ASD. When concluding such a small sample, it is important to recognize that individual differences can substantially influence responses to interventions such as DIR/Floortime™. Consequently, future research should consider larger sample sizes and extended study durations to enable a more comprehensive and nuanced examination of these variables.

Additionally, transportation challenges faced by participants—particularly those living farther from the intervention site—posed significant obstacles to consistent attendance. These difficulties often led to delays or cancellations of scheduled sessions, further reducing the sample size and limiting the study's statistical power. Limited access to a broader participant pool also restricted opportunities for comparative analyses of the treatment method's efficacy relative to alternative interventions.

The literature indicates that longer-term interventions are likely to produce more favorable outcomes; however, the feasibility of follow-up and continued treatment sessions in this study was limited. Consequently, these constraints limit our ability to draw robust conclusions about the durability and long-term sustainability of the observed treatment effects.

For future research, incorporating qualitative approaches—such as parent interviews and structured observational studies—could provide deeper insights into the intervention's effects on family dynamics and children's social interactions. This would enable a more comprehensive understanding of the nuanced, context-dependent impacts of DIR/Floortime™.

Moreover, it is recommended that this intervention be applied to support the mental health of children from divorced families, as these children often experience repressed emotions related to their parents. Future research should aim to include a larger sample size and a follow-up period to more comprehensively examine the impact of DIR/Floortime™ on children's social skills and overall adaptation. Given that DIR/Floortime™ is a relationship-based intervention, it is also suggested that future studies assess qualitative outcomes, such as duration of play, frequency of verbal communication, and levels of attention in children.

Conclusion

The findings of this study carry important practical implications for the social skills development of children with mild ASD. Based on these results, it is recommended that DIR/Floortime™ be applied to support children experiencing mental health challenges, including attention deficit hyperactivity disorder, anxiety disorders, and eating disorders. Furthermore, parent-focused educational programs should be implemented to increase awareness of children's psychological well-being, particularly

among children experiencing difficulties in social skill development.

Authors' Contributions

Solmaz Mohammadi: Conceptualized the study, designed the methodology, and contributed to data analysis. Also participated in drafting and revising the manuscript for intellectual content. Benyamin Hamid: Assisted in data collection and analysis, particularly in administering social skills assessments, and contributed to the interpretation of results and manuscript review.

Leila Ganji: Provided expertise in educational psychology and rehabilitation counseling, facilitating the application of the DIR/Floortime™ approach, and played a significant role in reviewing and editing the manuscript. Malek Amini: Contributed to study design and methodology development, offered insights on occupational therapy best practices, and assisted in manuscript revision. Marzieh Pashmdarfard: Critically assessed the manuscript and oversaw the research process as the corresponding author, ensuring the integrity and accuracy of the data. Coordinated communication among authors and contributed to manuscript writing and revisions. All authors have read and approved the final version of the manuscript.

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