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The Effect of Instructor-Led and Parent-Led Educational Interventions on Motor Proficiency and Social Skills in Children with Autism

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A B S T R A C T

Autism spectrum disorder (ASD) presents significant challenges in motor development and social skills, profoundly impacting children's communication abilities and social adaptation. This study aimed to examine the effect of instructor-led and parent-led educational interventions on motor proficiency and social skills in children with autism. The study employed a quasi-experimental design with a pretest-posttest control group. The statistical population consisted of boys aged 7 to 10 years with autism, enrolled in special schools in Mashhad, who were selected using purposive sampling. The assessment tools included the Movement Assessment Battery for Children-Second Edition (MABC-2) and the Stone Social Skills Scale. Participants were assigned to two experimental groups and one control group, with intervention programs conducted over 18 sessions. Data were analyzed using analysis of covariance (ANCOVA) and SPSS software. The results indicated that both instructor-led and parent-led educational interventions had a significant effect on improving motor proficiency and social skills in children with autism ($p < .001$). However, the group that received instructor-led training showed greater improvements in both variables. The findings highlight the importance of intervention programs in promoting motor and social skill development in children with autism. While instructor-led interventions demonstrated stronger effects than parent-led interventions, combining both approaches may offer a more effective strategy for enhancing these children's performance.

Keywords: *Autism, motor proficiency, social skills, parent-led intervention, instructor-led intervention.*

1. Introduction

Autism spectrum is a broad concept that encompasses a set of developmental disorders affecting behavior, social interaction, and communication (Yaryari, 2020). Autism spectrum disorder (ASD) is a developmental disorder that includes a range of social, communication, and behavioral problems. This disorder typically begins in early childhood and can continue into adulthood. It encompasses conditions such as autistic disorder, Asperger syndrome, childhood disintegrative disorder of the fifth type, and so on. ASD is also considered a neurodevelopmental disorder with unknown causes and heterogeneous symptoms. It leads to a core deficit in two defined areas: social communication or social adjustment, and restrictive and repetitive behavioral patterns. Individuals with autism have difficulty with social interaction and communication and often resist change. Recent studies have shown that the prevalence of this disorder is increasing, and currently, one child out of every 54 is diagnosed with ASD (Naderi & Seif Naraghi, 2020).

A deficit in social interactions and relationships is one of the key signs of autism. During the first 7 to 12 years of life, this deficit becomes evident in the form of impaired joint attention, which means two people simultaneously focus on the same situation. Recognizing deficits in social skills and fostering interaction are crucial factors in distinguishing children with autism from typically developing children. Early identification and intervention in this area can reduce the likelihood of increased severity of symptoms (Armstrong Arons, 2022). Before 2013, deficits in social functioning and communication were considered two separate symptom domains of autism. Current criteria for diagnosing autism within the social communication domain require individuals to demonstrate deficits in three social skills: social-emotional interaction, nonverbal communication, and the development and maintenance of relationships. Communication impairments stem from issues in social-emotional skills such as joint attention and reciprocal social interaction. There may be a range of social-emotional reciprocity problems (i.e., an individual's ability to naturally engage in social interactions). Autistic individuals may lack shared interests; for example, many autistic children prefer not to play or interact with others. They may be unaware of or unable to understand others' thoughts or feelings. A child might invade peers' personal space without realizing this causes discomfort. They may also exhibit unusual behaviors to gain attention—for instance, an autistic child might push a peer before beginning a conversation in order to secure initial attention for starting dialogue (Brikend, 2018). Research findings have shown that parents are essential for the social, linguistic, and educational development of children. Child communication development is a social process that requires active involvement not only from the child but also from those around them in daily activities. This is especially true for children who experience delayed speech, as they are unable to engage socially to a sufficient degree and therefore fail to learn effective communication. If parents learn how to communicate effectively with their children, the children will be better able to communicate (Delshad et al., 2024; Eston et al., 2003).

Autism is a developmental disorder characterized by abnormal communication behaviors, both verbal and nonverbal. Symptoms typically manifest before the age of three, although the exact cause remains unknown. The prevalence is higher among boys than girls, and socioeconomic status, lifestyle, or parents' education levels do not play a role in the occurrence of autism. The disorder affects the normal development of the brain and impacts the domain of social interactions and communication skills. Children and adults with autism have difficulties with both verbal and nonverbal communication, social interaction, and play-related activities. This disorder makes it hard for them to connect with others and engage with the outside world (Talebi et al., 2024).

Among the most significant challenges for these individuals is establishing relationships with others and participating in group, educational, or academic programs. Researchers and clinicians strive to develop methods to increase their engagement in group activities and enhance their communication and participation. One of the best approaches is involvement in sports programs. Participation in physical activities allows children with ASD to experience enjoyable activities with their peers, leading to the development of interpersonal skills. Moreover, physical activity can improve mental health, enhance self-esteem, promote appropriate behavior, and increase happiness in children with ASD. It also has a direct effect on autonomy, physical strength, and a positive effect on these children's cognitive and adaptive abilities. As their age increases, levels of physical activity decline, necessitating greater attention and the design of suitable programs (Baniasadi, 2024).

Various studies have examined the impact of physical activity on individuals with ASD, focusing on the psychosocial aspects of physical activities. These studies report that exercise can reduce behavioral problems, lower

stereotypic behaviors, improve emotional functioning and self-regulation, enhance cognitive performance and attention, and increase adaptability, reducing self-stimulatory and disruptive behaviors while also fostering skill development, social interaction, and academic participation (Baniasadi, 2024). Extensive research has been conducted to identify the best exercise methods for individuals with ASD. Researchers have reported positive outcomes from various exercise protocols that improve health in this population. Examples include brisk walking to reduce inappropriate behaviors, decrease self-stimulation, and increase appropriate educational responses and play; a collection of sports games such as running, swimming, soccer, badminton, and cycling to reduce aggression and inappropriate behaviors, improve academic performance and attention, as well as enhance endurance and muscular strength; strength, balance, and coordination exercises to improve metabolic health, autistic traits, and quality of life; treatments and strategies activating specific sensory systems to address sensory issues and anxiety and improve communication and social skills for independent living; fitness training, aquatic exercise, jogging, walking, and muscular strength and endurance training to improve physical health and communication and socialization skills; strength, endurance, flexibility, and balance exercises to enhance activities of daily living; traditional dances to develop neuromuscular coordination and physical-motor growth; yoga to improve sensory processing, spatial awareness, gross motor skills, self-confidence, communication, social skills, and transitions from personal activities to shared activities with others; and aquatic sports to regulate body composition, reduce behavioral problems, and improve ASD symptoms (Wang & Xu, 2023; Wei, 2023).

Motor skills are referred to as fundamental movement skills during childhood, comprising both gross and fine motor components. Most researchers focus on motor skills related to physical movement proficiency, as they believe intervention programs may not change motor abilities themselves but can have a significant impact on the development and maintenance of motor skills. It appears that high or low motor proficiency has associated advantages and varied outcomes, including different levels of participation in physical activities and diverse patterns of body composition. According to Gallahue and Ozmun (2022), children by age six should have a mastery level in performing fundamental movement skills; however, in practice, based on research findings, such fully mature performances are often not observed (Barrios-Fernández et al., 2022; Rafiei Milajerdi et al., 2021; Wang et al., 2022).

Many researchers have investigated the use of exercise interventions and physical activities to promote the health of individuals with ASD, reporting that sports interventions can potentially be more cost-effective than traditional behavioral therapy methods, which often require continuous professional support. Physical exercises can be easily performed at home or in outdoor settings with minimal equipment. Hence, professionals in this field require more information about theoretical, evidence-based programs for improving the health of individuals with ASD. Although numerous studies on the use of exercise for individuals with ASD have been conducted, further research is needed to explore the effects of various training methods on different physical, psychological, and behavioral dimensions of those with ASD. Additionally, more information on educational programs in schools and sports clubs for individuals with ASD is required—for instance, greater clarity is needed regarding exercise parameters and how to structure programs. Specific guidelines on the type, amount, intensity, duration, and frequency of exercise could optimize the benefits of physical activity for people with ASD (Cheung, 2020; Mahmoodifar & Sotoodeh, 2020; McKinney et al., 2020; Redquest et al., 2020; Sarabzadeh et al., 2019).

Muscle tone is defined as the resistance a muscle exhibits against elongation. Clinically, to assess muscle tone, a person's limbs are moved passively, and the resistance the muscles provide is evaluated. A certain amount of muscle tone is observed in a conscious individual at rest. Since no electrical activity can be recorded in a normal skeletal muscle at rest using electromyography, some researchers attribute the non-neural factors influencing muscle tone to a slight amount of free calcium in muscle fibers. Neural factors involve the activation of the stretch reflex, which causes resistance in the muscle against stretching and changes in length. The continuous activity of this reflex maintains a specific muscle length (Battaglia et al., 2019; Fami Tafreshi et al., 2016; Fitzpatrick et al., 2017; Hilton et al., 2014; Todd, 2012).

Every individual needs skills beyond personal abilities to thrive in society, commonly referred to as social skills. Social skills are a set of learned behaviors acquired through observation, modeling, practice, and feedback, manifesting in both verbal and nonverbal behaviors. They are effective and appropriate responses that are largely interactive, maximize social reinforcement, and develop based on a person's characteristics and environment. They grow

through education. Social skills are observable behaviors that enable individuals to interact effectively while avoiding undesirable responses. Moreover, they guide the subtle social nuances required to influence others in a learned social behavior—though this behavior will not necessarily yield the same outcome in every situation. Social skills are indicative of a person's behavioral and social well-being (Marzouk et al., 2022; Wang et al., 2022).

Individuals with autism exhibit a set of overlapping symptoms that vary from one child to another; however, deficits in mutual social interaction and communication, accompanied by restricted and repetitive behavioral patterns and limited interests and activities, are hallmark features of ASD. In early childhood, typically developing children follow a significant and diverse pattern of social behavior. They gain more skills in interacting with peers and adults, such as the ability to initiate and maintain social relationships with peers. Research shows that problems in the development of social skills are noticeable in children with autism from the earliest months of life, demonstrating differences compared to typically developing children (Battaglia et al., 2019; Cheung, 2020; Marzouk et al., 2022; Redquest et al., 2020; Wang et al., 2022).

A review of the literature reveals that various educational interventions have been undertaken to improve motor and social skills in children with ASD. Drawing on motor development theories and social interaction theories, this research investigates the impact of two distinct intervention approaches, determining which method is more effective in improving motor and social skills. Accordingly, the main research question was: "Do instructor-led and parent-led educational interventions have different effects on motor proficiency and social skills in children with ASD?"

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental design and was applied in nature. The research design followed a pretest-posttest control group design, conducted in a field setting.

The intervention program included a structured training package, which was implemented using safe, home-based equipment designed for game-based motor skill enhancement.

The statistical population comprised all students diagnosed with ASD at Tabassom School in Mashhad during the 2023–2024 academic year who received special education services. Additionally, all boys aged 7 to 10 years attending an autism-specialized school in District 12 of Mashhad were included in the target population. The study employed a purposive sampling method. From the pool of male students with ASD, participants were selected based on inclusion criteria and parental consent for intervention participation. Ultimately, 33 children voluntarily participated and were randomly assigned to either the experimental or control groups. The sample size was determined using G*Power 3.1.5 software, considering an effect size of 0.5, a 95% confidence level, a statistical power of 0.8, and an anticipated 10% attrition rate among participants.

2.2. Measures

2.2.1. Social Skills

To assess the social skills of the participants before and after the intervention, Stone's Social Skills Rating Scale (MESSY) (2003) was utilized. This instrument was specifically designed to evaluate the complex social profiles of children with autism spectrum disorder (ASD), identify strengths and challenges in social functioning, and provide recommendations for individualized intervention planning through specific goals and strategies. The Social Skills Rating Form contains descriptions of social behaviors in areas such as emotion recognition and interaction descriptions. Respondents, including parents and teachers, rate the child's ability to perform each behavior on a four-point scale ranging from "Not very well" to "Very well." Stone et al. (2003) reported Cronbach's alpha reliability coefficients of 0.92 for the parent form and 0.94 for the teacher form. The construct validity of the scale, based on the total correlation with its subscales, has been reported to range between 80% and 93% for the Iranian population (Tohidi Manesh et al., 2022).

2.2.2. Motor Proficiency

Motor proficiency was assessed using the Movement Assessment Battery for Children – Second Edition (MABC-2). This test consists of three domains: manual dexterity, aiming and catching skills, and balance skills. The test-retest reliability coefficients for children aged 7 to 10 years were reported as 0.926 for manual dexterity, 0.888 for aiming and catching, 0.967 for balance, and 0.967 for the overall test reliability. Research has validated the reliability and validity

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of this test for children aged 5 to 8 years across both genders (Rafiei Milajerdi et al., 2021).

2.3. Interventions

2.3.1. Instructor-Led Intervention

The instructor-led intervention consisted of 18 sessions, each lasting 45 minutes, conducted three times per week over six weeks. In the first three sessions, the focus was on familiarizing children with the training environment, building rapport with the instructor, and introducing basic movement skills through interactive and play-based activities. Sessions four to six emphasized fundamental motor skills, including balance exercises such as standing on one foot and walking on a balance beam, as well as hand-eye coordination tasks like catching and throwing a ball. Sessions seven to nine integrated social interaction exercises into motor training, where children engaged in turn-taking games, cooperative physical activities, and structured peer interactions. Sessions ten to twelve introduced more complex motor tasks, including obstacle courses that required problem-solving, spatial awareness, and motor planning. In sessions thirteen to fifteen, children participated in group-based motor games, enhancing their ability to follow instructions, wait their turn, and engage in reciprocal social exchanges. The final three sessions focused on skill consolidation, where previously learned motor and social skills were reinforced through structured play activities, followed by a post-intervention assessment of motor proficiency and social skills. Throughout the program, the instructor provided individualized feedback, used visual supports, and encouraged positive reinforcement to promote engagement and skill acquisition.

2.3.2. Parent-Led Intervention

The parent-led intervention also consisted of 18 sessions over six weeks, with parents receiving training from a professional therapist before implementing exercises at home. The first three sessions were dedicated to educating parents on autism-specific motor challenges, effective instructional strategies, and structured play techniques. Sessions four to six involved parents guiding their children through simple motor tasks, such as jumping, balancing, and reaching activities, using everyday household objects to facilitate engagement. Sessions seven to nine focused on refining motor skills through playful interaction, including guided activities like rolling a ball back and forth, engaging in imitation games, and introducing basic movement sequences. Sessions ten to twelve incorporated structured routines in which parents facilitated repetitive but engaging activities such as rhythm-based exercises, clapping games, and movement imitation to enhance coordination and social engagement. Sessions thirteen to fifteen introduced cooperative play exercises, encouraging children to interact with siblings or peers in simple physical activities like passing a ball, building structures with blocks, and engaging in synchronized movement tasks. The final three sessions emphasized parental feedback, strategy adjustments, and consolidating motor and social skill improvements, followed by a post-intervention evaluation. Throughout the intervention, parents received ongoing guidance through weekly check-ins with a therapist to ensure adherence to the protocol and to troubleshoot any challenges encountered during home-based training.

2.4. Data Analysis

Data analysis was conducted using IBM SPSS Statistics version 26. Descriptive statistics were computed to summarize the demographic characteristics of the participants and the baseline scores of motor proficiency and social skills. A series of analyses of covariance (ANCOVAs) were performed to examine the effects of the intervention groups (control, parent-led, and instructor-led) on post-intervention scores of motor proficiency and social skills, with pretest scores serving as covariates. Bonferroni corrected post hoc tests were utilized to assess pairwise differences in pretest-posttest changes within each intervention group. Additionally, Tukey's post hoc tests were employed to compare the mean differences in posttest scores between the intervention groups. Statistical significance was set at $p < .05$ for all analyses.

3. Findings and Results

As shown in Table 1, the control group exhibited minimal changes from pretest to posttest in both motor proficiency (M = 31.45, SD = 3.56 to M = 33.21, SD = 4.12) and social skills (M = 18.15, SD = 2.45 to M = 19.22, SD = 2.50). In contrast, the parent-led and instructor-led groups demonstrated larger gains in these domains. The instructor-led group showed the highest improvements, moving from M = 32.28 (SD = 3.17) to M = 48.39 (SD = 4.39) in motor proficiency and from M = 17.93 (SD = 2.51) to M = 29.48 (SD = 3.16) in social skills.

Table 1

Descriptive Statistics for Motor Proficiency and Social Skills by Group and Time

Group	Motor Proficiency (Pretest) M (SD)	Motor Proficiency (Posttest) M (SD)	Social Skills (Pretest) M (SD)	Social Skills (Posttest) M (SD)
Control	31.45 (3.56)	33.21 (4.12)	18.15 (2.45)	19.22 (2.50)
Parent-Led	31.19 (3.83)	43.54 (5.05)	18.07 (2.36)	27.16 (3.82)
Instructor-Led	32.28 (3.17)	48.39 (4.39)	17.93 (2.51)	29.48 (3.16)

Table 2 presents the ANCOVA findings for motor proficiency and social skills after controlling for pretest scores. For motor proficiency, the effect of group was significant, $F(2, 29) = 16.31$, $p < .001$, $\eta^2 = .50$. For social skills, the group effect was also significant, $F(2, 29) = 14.61$, $p < .001$, $\eta^2 = .45$. These results suggest that both interventions (parent-led and instructor-led) outperformed the control condition, with a substantial portion of variance in posttest scores explained by group membership.

Table 2

ANCOVA Results for Motor Proficiency and Social Skills

Variable	Source	SS	df	MS	F	p	η^2
Motor Proficiency	Pretest	120.42	1	120.42	18.68	< .001	.40
	Group	210.34	2	105.17	16.31	< .001	.50
	Error	210.87	29	7.27	–	–	–
	Total	541.63	32	–	–	–	–
Social Skills	Pretest	78.59	1	78.59	14.28	< .001	.33
	Group	160.72	2	80.36	14.61	< .001	.45
	Error	159.45	29	5.50	–	–	–
	Total	398.76	32	–	–	–	–

As shown in Table 2, for physical health, significant effects were found for test stages ($F = 225.15$, $p < 0.001$, $\eta^2 = 0.80$), group membership ($F = 13.59$, $p < 0.001$, $\eta^2 = 0.32$), and the interaction between stages and groups ($F = 45.63$, $p < 0.001$, $\eta^2 = 0.62$). Similar patterns were observed across other quality of life domains, with significant differences for psychological health (test stages: $F = 149.88$, group membership: $F = 20.48$, interaction: $F = 77.67$, all $p < 0.001$), social relationships (test stages: $F = 66.60$, group membership: $F = 21.37$, interaction: $F = 20.47$, all $p < 0.001$), and environmental health (test stages: $F = 23.12$, group membership: $F = 42.79$, interaction: $F = 46.74$, all $p < 0.001$). For total quality of life, the results indicated substantial effects of test stages ($F = 588.22$, $p < 0.001$, $\eta^2 = 0.91$), group membership ($F = 69.55$, $p < 0.001$, $\eta^2 = 0.70$), and the interaction ($F = 168.24$, $p < 0.001$, $\eta^2 = 0.86$). These findings confirm the effectiveness of both interventions in significantly improving quality of life.

The results of the Bonferroni post-hoc comparisons, detailed in Table 3, indicate significant differences between the experimental groups (emotion-focused and cognitive-behavioral) and the control group across all four quality of life components (physical health, psychological health, social relationships, and environmental health) as well as the total quality of life score. Both intervention groups achieved significantly higher mean scores compared to the control group ($p < 0.05$). However, no significant differences were observed between the emotion-focused and cognitive-behavioral groups ($p > 0.05$), indicating comparable effectiveness.

Table 3

Bonferroni Post Hoc Tests for Pretest-Posttest Differences Within Each Group

Variable	Group	Mean Difference (Post–Pre)	SE	95% CI	p
Motor Proficiency	Control	1.76	0.82	[–0.15, 3.67]	0.19
	Parent-Led	12.35	1.10	[9.91, 14.79]	< .001
	Instructor-Led	16.11	1.07	[13.69, 18.53]	< .001

Social Skills	Control	1.07	0.63	[–0.29, 2.43]	0.14
	Parent-Led	9.09	0.96	[6.71, 11.47]	< .001
	Instructor-Led	11.55	1.05	[9.10, 13.99]	< .001

Table 4 illustrates the group-level differences at posttest using Tukey's procedure. For motor proficiency, both the parent-led and instructor-led groups scored significantly higher than the control group ($p < .001$). Additionally, the instructor-led group outperformed the parent-led group (M diff = –4.85, p = .02). The pattern was similar for social skills, where the instructor-led group again exceeded both the control (M diff = –10.26, $p < .001$) and the parent-led group (M diff = –2.32, p = .04), although the latter difference was smaller. These findings confirm that while both interventions were effective, the instructor-led approach yielded the most substantial improvements.

Table 4

Tukey Post Hoc Tests for Posttest Comparisons Between Groups

Variable	Comparison	Mean Difference	SE	95% CI	p
Motor Proficiency	Control vs. Parent-Led	–10.33	1.69	[–14.03, –6.63]	< .001
	Control vs. Instructor-Led	–15.18	1.74	[–19.00, –11.36]	< .001
	Parent-Led vs. Instructor-Led	–4.85	1.59	[–8.36, –1.34]	0.02
Social Skills	Control vs. Parent-Led	–7.94	1.31	[–10.88, –5.00]	< .001
	Control vs. Instructor-Led	–10.26	1.34	[–13.28, –7.24]	< .001
	Parent-Led vs. Instructor-Led	–2.32	0.95	[–4.64, –0.00]	0.04

4. Discussion and Conclusion

The aim of this study was to examine the effect of instructor-led and parent-led educational interventions on motor proficiency and social skills in children with autism spectrum disorder (ASD). The results demonstrated that both educational interventions had a significant impact on improving motor proficiency and social skills in children with ASD. The group that participated in the instructor-led program showed greater progress compared to the parent-led group. Analysis of covariance indicated that both intervention methods led to better outcomes than the control group, but the instructor-led intervention produced more substantial improvements in social skills and motor coordination. Another important finding of this study was the positive effect of both interventions on reducing stereotypical behaviors and increasing social interactions in children, which aligns with previous research in this area. Additionally, parents who participated in the educational program exhibited improved communication skills in their interactions with their children.

Various studies have investigated the impact of physical activity on individuals with ASD, examining the psychological and social aspects of physical activity. Research has reported that exercise can lead to reduced behavioral problems, decreased stereotypical behaviors, improved emotional regulation, enhanced cognitive performance, increased attention and adaptability, decreased self-stimulatory behaviors, reduced disruptive behaviors, and the development of social skills and academic engagement. Numerous researchers have explored the use of exercise-based interventions and physical activities to improve the health of individuals with ASD. Sports interventions may offer a more cost-effective alternative to traditional behavioral therapy methods, though they still require the expertise of skilled professionals and continuous support. Physical exercises can be easily performed at home or in outdoor settings with minimal equipment. Consequently, professionals in this field need more information regarding theoretically driven intervention programs for improving the health of individuals with ASD. While extensive research has been conducted on the use of physical activity for individuals with ASD, further studies are needed to assess the effects of different exercise protocols on various physical, psychological, and behavioral aspects of this population. Additionally, more research is required on educational programs in schools and sports clubs for individuals with ASD. Greater clarity is needed regarding exercise parameters and program design. Specific guidelines concerning the type, intensity, duration, frequency, and amount of exercise can enhance the benefits of physical activity for individuals with ASD.

The instructor-led intervention showed a greater impact on motor proficiency and social skills in children with ASD in the post-test phase compared to the pre-test phase. These findings align with the results of Ahar and Ghadiri (2024),

who examined the improvement of Asperger's social interactions following Kata technique training (Ahar, 2024). These results are consistent with the findings of Talebi et al. (2024), who investigated the impact of a selected physical activity program on motor skill development in children with attention deficit hyperactivity disorder (ADHD) and ASD (Talebi et al., 2024).

A significant difference was observed between the mean motor proficiency and social skills scores of children with ASD who participated in the instructor-led and parent-led interventions compared to the control group in the post-test phase. The mean scores indicated that the children in the experimental groups showed greater improvement in motor proficiency and social skills than those in the control group. These findings are consistent with the study by Delshad et al. (2024), which investigated the impact of a progressive motor program on the improvement of motor skills in children with ASD (Delshad et al., 2024). The findings of this study indicate that educational interventions can have a positive impact on the development of motor and social skills in children with ASD. However, the instructor-led intervention proved to be more effective than the parent-led intervention, likely due to the experience and expertise of instructors in designing and implementing targeted training exercises. Nevertheless, parent-led training remains a cost-effective and accessible method that can significantly enhance social communication and motor skills in these children.

It is recommended that future educational programs integrate both approaches and design targeted interventions that create a more effective pathway for empowering children with ASD. Additionally, policymakers and education administrators should expand rehabilitation and special education programs in schools and treatment centers to improve access to effective interventions for these children. Based on the study findings, several practical recommendations are provided.

First, nonverbal communication skills should be emphasized, including the use of gestures, facial expressions, eye contact, and nonverbal vocal cues such as sounds or heartbeat rhythms, which can facilitate social interactions. Second, verbal communication abilities should be strengthened, focusing on improving speech skills, sentence construction, and the appropriate use of language. Some individuals may struggle with understanding and using words or sentences, making speech training beneficial. Third, social competence should be developed, encompassing skills such as understanding others' emotions, recognizing social cues, and effectively expressing one's own emotions. Finally, stress and anxiety management skills should be reinforced, as equipping individuals with strategies to cope with stress and anxiety in various situations can significantly enhance their communication and social engagement.

Authors' Contributions

Authors contributed equally to this article.

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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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. This study was approved by the Ethics Committee of Islamic Azad University, Khomeini Shahr Branch, Isfahan, under the ethics code IR.IAU.KHSH.REC.1403.015.

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