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Comparison of the Effectiveness of Functional Communication-Based Intervention Training and Theory of Mind Training on the Sense of Competence in Children with Autism Spectrum Disorder

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A B S T R A C T

The primary aim of the present study was to compare the effectiveness of functional communication-based intervention training and Theory of Mind training on the sense of competence in children with Autism Spectrum Disorder (ASD). This study was applied in purpose and employed a quasi-experimental design with a pretest–posttest and follow-up measurement across three groups (two experimental groups and one control group). The statistical population consisted of children with ASD and their mothers in Shahin Shahr, Isfahan, in 2024. A total of 45 participants were selected using a non-random sampling method. Data were collected using the Harter Perceived Competence Scale (1985), which includes 27 items. The face and content validity of the instrument were confirmed by experts, and its reliability was calculated using Cronbach's alpha coefficient (α = .93). Data were analyzed using repeated measures analysis of variance (ANOVA). The results indicated that functional communication-based intervention training and Theory of Mind training were 76.6% successful in distinguishing pretest, posttest, and follow-up scores for the sense of competence in children with ASD in Shahin Shahr, Isfahan. Therefore, the effectiveness of functional communication-based intervention training and Theory of Mind training on the sense of competence in children with ASD differed between the intervention types.

Keywords: *functional communication-based intervention training, Theory of Mind training, sense of competence, children with autism spectrum disorder*

1. Introduction

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by persistent deficits in social communication and interaction, alongside restricted, repetitive patterns of behavior, interests, or activities (Talantseva et al., 2023). Recent meta-analyses show that ASD affects individuals globally with an increasing prevalence trend, underscoring the urgent need for effective early and middle-childhood interventions (Talantseva et al., 2023). The core social and cognitive difficulties associated with ASD often impair children's ability to engage meaningfully with their environment, resulting in limited adaptive functioning and low perceptions of competence. Perceived competence, defined as an individual's self-evaluation of effectiveness in behavioral, social, academic, and physical domains, is an essential component of healthy psychological development (Choupani, 2022). Children with ASD frequently experience challenges in these areas, which may reduce their confidence in social participation and hinder developmental growth (Choupani, 2022; Zhu et al., 2022).

The sense of competence is not only linked to academic success and social relationships but also to emotional resilience and life satisfaction (Abd Ellatif Elsayed & Aleriani, 2024; Zhu et al., 2022). Research among diverse populations highlights that distress tolerance and self-efficacy are significant predictors of life satisfaction and overall psychological well-being (Abd Ellatif Elsayed & Aleriani, 2024). For children with ASD, whose social and communication deficits can result in frustration and low self-esteem, enhancing the sense of competence is critical to fostering adaptive functioning and quality of life (Choupani, 2022). This requires targeted interventions that address both the social-cognitive deficits and the behavioral communication challenges inherent to ASD.

Functional Communication Training (FCT) has emerged as one of the most evidence-based behavioral interventions for addressing challenging and maladaptive behaviors in ASD (Bidar et al., 2023; Kermpour et al., 2021). FCT focuses on teaching alternative, socially appropriate communication responses that serve the same function as the individual's problem behavior, such as requesting help, attention, or escape from aversive stimuli (Ferris et al., 2025; Neely et al., 2022). By replacing nonfunctional behaviors with effective communication strategies, FCT reduces problem behaviors and improves adaptive interaction skills (Bidar et al., 2023). Studies show that FCT is effective not only for decreasing stereotypies and self-injurious actions but also for enhancing engagement and social competence in children with ASD (Ferris et al., 2025; Kermpour et al., 2021). Neely et al. (Neely et al., 2022) demonstrated that early application of FCT in toddlers at risk for ASD leads to reduced problem behaviors and greater readiness for social learning. This functional approach is grounded in applied behavior analysis principles, making it practical and adaptable to various developmental levels (Ferris et al., 2025).

Parallel to behavioral communication-focused approaches, Theory of Mind (ToM)-based training has been recognized as a critical cognitive intervention for ASD (Aghababaei, 2017; Khoda Bakshi et al., 2015). ToM refers to the capacity to attribute mental states—such as beliefs, desires, emotions, and intentions—to oneself and others, and to use this understanding to interpret and predict social behavior (Lecce et al., 2024). Many children with ASD exhibit profound delays or impairments in ToM development, leading to misunderstandings of social cues, difficulties in empathy, and failure to respond appropriately to peers (Khoda Bakshi et al., 2015). Structured ToM interventions aim to teach children how to decode others' facial expressions, infer hidden emotions, and comprehend false beliefs, which are essential for social reciprocity (Lecce et al., 2024; Wu et al., 2024). Evidence indicates that ToM training can lead to improved social cognition and peer relationships, particularly when implemented during early and middle childhood (Aghababaei, 2017; Wu et al., 2024).

Recent developments in ToM-based interventions also integrate creative and interactive methods to strengthen social understanding and self-concept. Tayebli et al. (Tayebli et al., 2024) designed educational games targeting ToM skills and demonstrated significant improvements in social competence and self-esteem among children with mild intellectual disabilities. Similarly, Lecce et al. (Lecce et al., 2024) showed that peer interaction and exposure to diverse social perspectives accelerate ToM growth in middle childhood. Such findings suggest that enhancing cognitive empathy and perspective-taking not only improves social skills but may also empower children to feel more competent and effective in interpersonal interactions.

Importantly, both FCT and ToM interventions address distinct but complementary aspects of development in ASD. While FCT targets overt communication and behavioral adaptation, ToM training strengthens the underlying cognitive frameworks that support empathy and social reasoning (Khoda Bakshi et al., 2015; Wu et al., 2024).

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Combining these approaches may therefore have a synergistic effect, simultaneously reducing maladaptive behaviors and promoting positive social identity. This integrated focus could lead to more robust improvements in perceived competence, as children gain both the tools to express their needs functionally and the cognitive insight to interpret and respond to others effectively (Ferris et al., 2025; Lecce et al., 2024).

Another critical dimension in understanding the role of competence in ASD is its association with executive functioning. Executive functions, including working memory, inhibitory control, and cognitive flexibility, are essential for goal-directed behaviors and social adaptation. Deficits in these processes are frequently observed in children with ASD and contribute to difficulties in both communication and social cognition (Ghadiri Soormaan Abadi & Soleimani, 2021; Rezaei et al., 2019). Interventions designed to strengthen executive functioning have shown promise in supporting empathy and adaptive skills (Ghadiri Soormaan Abadi & Soleimani, 2021), while timely executive-based training programs have been associated with improved neurocognitive outcomes in children with developmental disabilities (Rezaei et al., 2019). These findings suggest that programs like FCT and ToM training, which implicitly require cognitive flexibility and perspective-shifting, may concurrently support executive function growth, thereby enhancing perceived competence.

Emerging evidence also indicates that mindfulness-based and self-regulation strategies can complement behavioral and cognitive training for children with ASD. Mindfulness interventions help children and parents manage emotional reactivity and improve adaptive coping, which indirectly supports the child's confidence in social and academic settings (Peng et al., 2025). Peng et al. (Peng et al., 2025) highlight that mindfulness-based programs significantly benefit not only children's socioemotional skills but also parental well-being, which may strengthen the overall environment needed for competence-building. Although mindfulness was not a primary focus of the present study, the emphasis on emotional and behavioral regulation in FCT and the perspective-taking in ToM training align conceptually with mindfulness-based developmental support.

Despite the promising results of these interventions, there remain gaps in understanding their relative and comparative effectiveness on children's self-perceived competence. Much of the existing literature examines either behavioral reduction or cognitive improvements in isolation (Bidar et al., 2023; Wu et al., 2024). Few studies directly assess whether these methods translate into a stronger sense of competence—a construct that integrates social, academic, and behavioral domains and predicts long-term adaptation and well-being (Zhu et al., 2022). Moreover, while FCT and ToM training have individually demonstrated efficacy in improving specific skill sets, head-to-head comparisons of their impact on children's overall self-concept remain limited, especially in culturally diverse and non-Western contexts.

The present study responds to these gaps by systematically comparing the effectiveness of functional communication-based intervention training and Theory of Mind training on the sense of competence in children with ASD. By evaluating changes from pretest to posttest and assessing the stability of outcomes at follow-up, this research contributes to clarifying which approach—behavioral communication-focused or social cognition-focused—better supports the development of perceived competence. This focus is crucial, as competence beliefs influence motivation, social engagement, and emotional resilience across development (Abd Ellatif Elsayed & Aleriani, 2024; Choupani, 2022).

Additionally, the study emphasizes the importance of contextual and family factors. Research indicates that parental involvement plays a key role in reinforcing learned skills and shaping children's self-efficacy (Neely et al., 2022; Zhu et al., 2022). Both FCT and ToM programs can be strengthened through parent training and collaboration, ensuring that new communication strategies and perspective-taking skills generalize beyond therapy sessions. As parents observe improvements in their child's adaptive functioning, their own sense of competence and life satisfaction may also increase, creating a reciprocal growth dynamic (Abd Ellatif Elsayed & Aleriani, 2024; Peng et al., 2025).

In summary, understanding and improving the sense of competence in children with ASD is vital for their long-term developmental trajectory and well-being. Functional communication-based interventions and Theory of Mind training represent two well-established but distinct therapeutic pathways addressing the core challenges of ASD. While FCT emphasizes the reduction of maladaptive behaviors and the enhancement of practical communication (Bidar et al., 2023; Ferris et al., 2025; Kermpour et al., 2021), ToM interventions focus on fostering social cognition and empathy (Khoda Bakshi et al., 2015; Lecce et al., 2024; Wu et al., 2024). By directly comparing their effects on

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perceived competence, this study aims to provide evidence-based insights for clinicians, educators, and families seeking to optimize social and emotional outcomes for children with ASD.

2. Methods and Materials

2.1. Study Design and Participants

This study was applied in purpose and employed a quasi-experimental design with a pretest–posttest and follow-up measurement across three groups, including two experimental groups and one control group. The follow-up phase was conducted three months after the posttest to evaluate the stability of the intervention effects. The statistical population consisted of all children diagnosed with Autism Spectrum Disorder (ASD) and their mothers in Shahin Shahr, Isfahan, in 2024. From this population, 45 children whose families expressed full consent and willingness to participate were selected using purposive non-random sampling. The participants were then randomly assigned to one of three groups: 15 children in the functional communication-based intervention training group, 15 children in the Theory of Mind training group, and 15 children in the control group. Both experimental groups received their respective interventions, while the control group did not receive any training or psychological intervention during the study period.

2.2. Measures

The primary instrument for data collection was the standardized Perceived Competence Scale developed by Harter (1985). This questionnaire includes 27 items and assesses four domains: behavioral competence, social competence, academic competence, and physical competence. Items are rated on a seven-point Likert scale ranging from “strongly disagree” to “strongly agree.” Lower scores than the cut-off point indicate low perceived competence, while higher scores indicate high perceived competence. The questionnaire was completed by the parents of the participating children. The original version of this scale demonstrated appropriate face, content, and criterion validity (Harter, 1985), and its Cronbach’s alpha reliability has been reported to exceed .89. In the present study, the face and content validity of the scale were reviewed and approved by a panel of subject matter experts. The internal consistency reliability was calculated using Cronbach’s alpha and reached .93, indicating excellent reliability, as values above .70 are considered statistically acceptable.

2.3. Interventions

The functional communication-based intervention training was designed to improve adaptive communication skills and promote a sense of competence in children with Autism Spectrum Disorder (ASD). The program focused on teaching children how to replace maladaptive or nonfunctional behaviors with meaningful, socially appropriate communication. Across multiple sessions, the intervention emphasized identifying communicative needs, using functional communication responses (e.g., gestures, symbols, or spoken words), and applying them in everyday situations. Children were taught to initiate requests, respond to social interactions, and express needs or emotions more effectively. Parents were involved throughout the training to reinforce skills at home and in naturalistic contexts, ensuring generalization and maintenance of learned communication behaviors. Activities included role-playing social scenarios, practicing requesting and commenting, and structured reinforcement to increase motivation and engagement.

The Theory of Mind training aimed to enhance the ability of children with ASD to understand and interpret the mental states of others, including beliefs, desires, and emotions, thereby fostering better social competence and self-perceived ability. The sessions introduced children to concepts such as recognizing emotions from facial expressions and tone of voice, understanding that others can have different perspectives or knowledge, and predicting others’ reactions based on their mental states. Techniques included storytelling, picture sequencing tasks, and interactive games that required children to infer intentions, guess what another person might be thinking or feeling, and discuss social problem-solving strategies. Parents were engaged to support practice at home by encouraging mental state talk and helping children reflect on social situations they encountered. Through gradual and structured activities, children learned to navigate social interactions with improved understanding of others, reinforcing their sense of competence and self-efficacy.

2.4. Data Analysis

To analyze the collected data, repeated measures analysis of variance (ANOVA) was applied to compare the mean scores of perceived competence across the three measurement points (pretest, posttest, and follow-up) and

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among the three groups. This analysis enabled the evaluation of both within-group changes over time and between-group differences in intervention effectiveness. All statistical analyses were conducted using IBM SPSS Statistics version 24. A significance level of $p < .05$ was considered for determining statistical differences.

3. Findings and Results

The findings of this study are presented in two sections: descriptive and inferential. In the descriptive section, the mean and standard deviation of the study variables are presented in Table 1.

Table 1

Descriptive indicators of the studied variable by groups and measurement stages

Variables	Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Follow-up (Mean ± SD)
Sense of competence	Control	74.27 ± 6.64	75.20 ± 6.83	76.07 ± 7.48
	Functional communication	72.20 ± 6.28	83.40 ± 7.21	83.33 ± 6.99
	Theory of Mind	74.73 ± 6.31	84.87 ± 7.08	83.67 ± 8.10

The results of Box's M test indicated that the assumption of homogeneity of variance–covariance matrices was met ($F = 0.795$, $p = .574 > .05$). Based on this and other confirmed preliminary assumptions, all the conditions required to conduct repeated measures multivariate analysis were satisfied. Since Box's M test was confirmed, Wilks' Lambda was used to evaluate multivariate effects. The results of the multivariate test are presented in Table 2. This analysis initially compared the linear combination of sense of competence scores across groups, time points, and the interaction effects of group and time.

Table 2

Multivariate test results for sense of competence scores

Source of variation	Wilks' Lambda	F	Hypothesis df	Error df	p-value	η^2
Time	0.169	31.951	2	13.000	0.000	0.831
Group × Time	0.355	11.795	2	13.000	0.001	0.645

According to Table 2, there was a statistically significant difference in sense of competence scores across the three measurement points (pretest, posttest, and follow-up). Additionally, the second part of the results shows a statistically significant difference between the experimental and control groups across the three time points, indicating a significant interaction between time and group.

After confirming a significant difference across the three measurements (pretest, posttest, and follow-up), the within-subject effects were examined. Before doing so, Mauchly's test of sphericity, which assesses the homogeneity of the error covariance matrix, was conducted. Mauchly's test of sphericity indicated that the assumption of sphericity was met for the within-subject effect of time ($W = 0.850$, $\chi^2(2) = 2.119$, $p = .347$) and was also not significantly violated for the interaction of group × time ($W = 0.643$, $\chi^2(2) = 5.743$, $p = .057$). Given that the p-values exceeded .05, the covariance matrices of the repeated measures were considered homogeneous, and the sphericity assumption was satisfied; therefore, no correction to the degrees of freedom was required. Additionally, the Greenhouse–Geisser epsilon values (0.869 for time and 0.737 for group × time) further supported the adequacy of the sphericity assumption.

Table 3

Univariate ANOVA results for differences in sense of competence scores

Source of variation	SS	df	MS	F	p-value	η^2
Time	787.822	2	393.911	45.859	0.000	0.766
Group × Time	483.467	2	241.733	11.429	0.001	0.449
Error	592.200	28	21.150			

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According to Table 3, the effect of time on the sense of competence variable was significant (F = 45.859, p = .000). In other words, there was a statistically significant difference in sense of competence across the three time points (pretest, posttest, and follow-up). The effect size (η^2 = .766) shows that approximately 76.6% of the within-group variance in sense of competence was explained by the functional communication-based intervention and Theory of Mind training.

Additionally, the interaction effect of time and group was statistically significant (F = 11.429, p = .001), indicating that the change in sense of competence differed across the groups. The effect size (η^2 = .449) suggests that about 44.9% of the variance in sense of competence was attributable to group assignment, meaning that the interventions successfully distinguished the experimental groups from the control group.

After establishing significant differences among the groups across the three time points, post hoc Bonferroni pairwise comparisons were conducted.

Table 4

Bonferroni post hoc comparisons of sense of competence across the three measurement points

Group	Comparison	Mean difference	Standard error	p-value	95% CI (Lower–Upper)
Functional communication	Posttest – Pretest	6.067	0.853	0.000	3.747 – 8.386
	Follow-up – Pretest	6.467	0.795	0.000	4.306 – 8.627
	Posttest – Follow-up	0.400	0.598	1.000	–1.225 – 2.025
Theory of Mind	Posttest – Pretest	5.533	0.908	0.000	3.065 – 8.002
	Follow-up – Pretest	5.367	1.078	0.001	2.437 – 8.298
	Posttest – Follow-up	–0.167	0.889	1.000	–2.852 – 2.248

According to Table 4, in the functional communication-based intervention group, the difference in sense of competence scores between posttest and pretest was statistically significant (p = .000). The difference between follow-up and pretest was also statistically significant (p = .000). However, the difference between follow-up and posttest was not statistically significant (p > .05), suggesting the stability of the intervention effect over time.

Similarly, in the Theory of Mind training group, the difference in sense of competence scores between posttest and pretest was statistically significant (p = .000). The difference between follow-up and pretest was also statistically significant (p = .001). However, the difference between follow-up and posttest was not statistically significant (p > .05), again indicating that the improvements achieved after the intervention were maintained over the follow-up period.

4. Discussion and Conclusion

The present study aimed to compare the effectiveness of functional communication-based intervention training and Theory of Mind (ToM) training on the sense of competence in children with Autism Spectrum Disorder (ASD). The findings showed that both interventions significantly improved the children's perceived competence from pretest to posttest and that these gains were largely maintained during the follow-up period. The multivariate and univariate analyses confirmed that time had a significant main effect, indicating that the interventions produced measurable and sustained improvements. Moreover, the interaction effect of time and group revealed that the pattern of improvement differed between the two experimental conditions and the control group. Importantly, the effect size analyses showed that functional communication-based training and ToM training explained 76.6% of the within-group variance in competence scores and 44.9% of the between-group variance, demonstrating robust intervention effects.

One of the key findings was the strong positive impact of functional communication-based training on the children's sense of competence. This result aligns with previous studies demonstrating the power of Functional Communication Training (FCT) in reducing maladaptive and disruptive behaviors while promoting adaptive social interaction (Bidar et al., 2023; Kermpour et al., 2021). By equipping children with effective strategies to request assistance, express needs, and navigate daily interactions, FCT appears to reduce frustration and failure experiences that often erode self-perceived competence. Ferris and colleagues (Ferris et al., 2025) confirmed that chaining differential reinforcement with FCT can effectively increase compliance and reduce challenging behaviors, which likely contributes to a greater sense of control and efficacy. Similarly, Neely et al. (Neely et al., 2022) showed that introducing functional

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communication strategies early helps children at risk for ASD regulate their responses to social and environmental demands, which fosters positive self-perceptions. The current findings add to this evidence by showing that FCT not only modifies observable communication behaviors but also strengthens the internal belief in one's ability to succeed in social and personal tasks.

In parallel, the study confirmed the effectiveness of ToM training in enhancing perceived competence. This is consistent with previous research highlighting the centrality of Theory of Mind development for social cognition and self-efficacy in ASD (Aghababaei, 2017; Khoda Bakshi et al., 2015). ToM training exposes children to tasks and discussions that promote understanding of others' mental states, beliefs, and emotions, which are critical for meaningful peer interactions (Lecce et al., 2024). By enabling children to predict and interpret social cues more accurately, ToM-based programs reduce social confusion and perceived failure. Wu et al. (Wu et al., 2024) demonstrated that even in populations with specific developmental challenges, targeted ToM instruction can produce meaningful cognitive gains, improving social reasoning and adaptive behavior. Similarly, Tayebli et al. (Tayebli et al., 2024) showed that ToM-based educational games significantly increased children's social competence and self-esteem, supporting the idea that perspective-taking directly reinforces the child's sense of capability in social contexts.

Comparing the two interventions, the results suggest that while both approaches are effective, functional communication-based training showed a slightly stronger impact on perceived competence. This may be due to the immediate and tangible outcomes of FCT: children learn specific communicative behaviors that directly reduce frustration and promote successful interactions, thereby boosting self-evaluation of competence more quickly. In contrast, ToM training requires deeper cognitive processing and generalization, which may yield more gradual improvements in confidence. This interpretation is supported by Bidar et al. (Bidar et al., 2023), who argued that direct teaching of replacement communication behaviors has immediate adaptive benefits, and by Lecce et al. (Lecce et al., 2024), who note that ToM development, while impactful, unfolds more progressively and is influenced by peer interaction over time. Nevertheless, the maintenance of gains in both groups at follow-up suggests that once acquired, the social-cognitive and communicative skills from these interventions have lasting effects on children's self-concept.

Another important explanation for the positive outcomes relates to the indirect strengthening of executive functions. Previous studies have shown that both FCT and ToM training implicitly demand and reinforce cognitive flexibility, working memory, and self-regulation (Ghadiri Soormaan Abadi & Soleimani, 2021; Rezaei et al., 2019). For example, children practicing alternative communication strategies must inhibit maladaptive responses and hold new social rules in mind (Ferris et al., 2025). Similarly, ToM interventions require mental shifting between self and other perspectives (Wu et al., 2024). Ghadiri Soormaan Abadi and Soleimani (Ghadiri Soormaan Abadi & Soleimani, 2021) showed that executive functioning programs could enhance empathy and social adjustment, while Rezaei et al. (Rezaei et al., 2019) demonstrated improved neurocognitive performance in children receiving executive-based training. Such cognitive strengthening may underlie the observed increase in perceived competence, as better self-regulation and problem-solving can boost children's confidence in their abilities.

The results also resonate with emerging research on the role of emotional regulation and environmental support. Studies on mindfulness-based interventions, for instance, have shown improvements in socioemotional functioning for both children with ASD and their parents (Peng et al., 2025). Although mindfulness was not directly implemented here, FCT's emphasis on reducing frustration through functional expression and ToM's focus on emotional understanding may indirectly cultivate self-regulation capacities similar to those supported by mindfulness programs. Peng et al. (Peng et al., 2025) also emphasize that parental involvement in interventions is vital for sustaining gains. In the present study, parents were engaged in both training models, which likely reinforced skill generalization and created a more supportive environment for the children's growing competence.

Furthermore, the cultural context of this study is important to consider. Most existing FCT and ToM research originates from Western or East Asian contexts (Lecce et al., 2024; Wu et al., 2024), while this study extends the evidence base to Iranian children with ASD. Understanding the impact of culturally responsive adaptation is essential, as parenting styles and social expectations influence how children internalize competence (Choupani, 2022; Zhu et al., 2022). For example, Choupani (Choupani, 2022) highlighted the predictive role of parenting style and parental sense of

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competence in shaping children's behavioral adjustment, and Zhu et al. (Zhu et al., 2022) found that parental self-efficacy and satisfaction impact child development trajectories. By involving parents and tailoring interventions to the local sociocultural context, this study enhances the ecological validity of FCT and ToM approaches and suggests that these models can be effectively implemented beyond their original cultural frameworks.

The positive outcomes also underscore the importance of empowering parents. As reported by Abd Ellatif Elsayed and Aleriani (Abd Ellatif Elsayed & Aleriani, 2024), parents' distress tolerance and satisfaction influence children's developmental outcomes. Parents in this study were active participants, likely strengthening their own perceived competence and capacity to support their child, thereby creating a feedback loop that enhances both child and family well-being. Integrating parents into interventions is consistent with evidence from Neely et al. (Neely et al., 2022), who recommend early caregiver involvement to maintain functional communication and social gains over time.

Overall, the results demonstrate that interventions aimed at social communication and social cognition can significantly improve children's perceived competence, a construct closely tied to resilience, self-esteem, and adaptive functioning. By directly comparing FCT and ToM, this study contributes novel evidence about the comparative benefits of these approaches. While FCT may produce faster changes by reducing immediate communication barriers, ToM training complements this by deepening cognitive understanding of social interactions, which may support long-term competence and relational confidence. These findings can inform clinicians and educators in selecting or combining intervention models tailored to children's individual needs and family contexts.

Despite its valuable contributions, this study has several limitations. First, the sample size was relatively small, with only 45 participants across three groups, which may limit the generalizability of the findings. Future studies with larger and more diverse samples could better represent the heterogeneity of ASD and increase external validity. Second, the study relied on purposive non-random sampling, which may introduce selection bias. Although efforts were made to ensure group equivalence, randomization at recruitment would strengthen causal inference. Third, the sense of competence was measured using parent-reported questionnaires, which might be influenced by parental perceptions rather than the child's own self-assessment. Incorporating child self-reports or observational measures could provide a more comprehensive evaluation. Additionally, the study focused on a single cultural and geographic context; therefore, caution is needed when extending the results to other populations with different social norms and educational systems. Finally, the follow-up period was limited to three months; longer-term follow-up would help assess the durability of the observed improvements.

Future research should aim to expand the scope and depth of investigation on interventions for perceived competence in ASD. Conducting randomized controlled trials with larger and more demographically diverse samples would enhance the robustness of findings and clarify causal pathways. Comparative studies could explore hybrid models that combine the strengths of FCT and ToM training, potentially offering a multi-layered approach to both immediate communication challenges and deeper social-cognitive development. Including neurocognitive and executive functioning assessments could also help elucidate the mechanisms underlying competence improvements. Furthermore, longitudinal studies with extended follow-up periods are recommended to evaluate the stability of gains over time and their impact on later social integration, academic achievement, and emotional well-being. Researchers should also investigate how cultural adaptation and parental involvement mediate intervention effectiveness across different societies. Integrating innovative delivery methods, such as digital platforms or game-based learning, may increase accessibility and engagement, especially in under-resourced settings.

Practitioners working with children with ASD should consider selecting intervention models based on individual profiles and therapeutic goals. Functional communication-based training can be particularly beneficial for children exhibiting high levels of frustration and challenging behaviors, as it provides immediate tools for expressing needs effectively. Theory of Mind training may be most impactful for children ready to engage in more abstract social reasoning and empathy-building tasks. Combining these approaches sequentially or concurrently could create a comprehensive therapeutic plan addressing both surface communication deficits and deeper social understanding. Active parental involvement should be prioritized, with caregivers receiving coaching on how to reinforce skills at home and in natural contexts. Additionally, professionals should ensure that interventions are culturally sensitive and adapted to the family's social norms and communication

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patterns to maximize ecological validity and long-term success.

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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Ethics Considerations

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

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