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Promote and increase social skills in a child with autism spectrum disorder through psycho-educational training on emotional skills

Nocetti E.,^{1*}, Cattalini M.,²

¹ University of Parma, Italy

² Tice Cooperativa Sociale, Correggio, Italy

Background: This study evaluates the effects of a psycho-educational intervention on the promotion and strengthening of emotional skills and investigates, through evidence-based procedures, the impact of these on the social skills of a school-age child (7 years old) with a diagnosis of Autism Spectrum Disorder (ASD) and Speaker-Listener level of verbal development. The initial evaluation highlighted the need to expand the child's emotional vocabulary by introducing new bodily and behavioral cues, as well as verbal expressions. It highlighted shortcomings in reporting episodes consistent with the described emotion, indicating difficulty attributing the emotional state to personal situations or others.

Methods: Using a single-subject experimental design with pre- and post-probes, the first dependent variable measured is the child's ability to correctly recognize the four basic emotions (happiness, sadness, fear, and anger) and attribute an interpretation to the behavior of others. The second dependent variable measured is social competence, assessed in two 15-minute sessions of symbolic play. The independent variable measured, instead, in this study is psycho-educational training offered to the student in a small group.

Results: The results indicate a general improvement in the skills taught; however, they do not currently enable us to assess the generalization of these behaviors in everyday life contexts.

Conclusions: Future studies could extend this research to different contexts and participants.

Keywords: Autism spectrum disorder; Socio-Emotional skills; Psycho-Educational Training; Emotional development; Young children; Single-subject Experiment

* Corresponding author: Elena Nocetti, University of Parma
E-mail address: elena.nocetti@hotmail.it

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Introduction

In a world where academic skills are often prioritized, research has highlighted the crucial role of social-emotional skills in children's success in interacting with both physical and social environments. These skills include the ability to recognize, understand, and manage one's emotions; make effective and flexible decisions adapted to different contexts; establish positive relationships with others; and appropriately handle challenging situations (Petrina et al., 2017; Goldsmith & Kelley, 2018; Nucifora & Walker, 2021).

In everyday life, individuals are generally aware of their emotional states, able to recognize them, and communicate them to others, thus regulating their behavior according to the context. However, for children and adolescents with Autism Spectrum Disorder (ASD), this process is often disrupted. These individuals may experience significant difficulties in understanding and managing both their own and others' emotions, which directly impacts their social behavior.

ASD is characterized by severe and persistent deficits in social communication and interaction, along with restricted and repetitive patterns of behavior (American Psychiatric Association, 2013). Such deficits hinder the development and maintenance of social relationships, often resulting in challenges related to two-way conversations and emotional reciprocity (Knott et al., 2006). Social communication impairments may manifest in difficulties interpreting and expressing emotions, responding to social cues, imitating behaviors, and understanding mental states both in oneself and others (Clark et al., 2008; Zwaigenbaum et al., 2005).

A significant limitation of most social skills interventions specifically designed for children with ASD is the lack of scientific evidence demonstrating whether improvements observed under experimental conditions generalize to real-life social functioning. To address this gap, Einfeld et al. (2018) emphasized the importance of conducting interventions within school settings. In their empirical research, they evaluated the Secret Agent Society (SAS) Program (Beaumont, 2009), which employs an engaging spy-themed game supported by visual tools that facilitate the generalization of acquired skills, such as recognizing and expressing emotions, initiating conversations, resolving conflicts, and managing bullying behaviors. This program emphasizes the importance of directly teaching emotion recognition and regulation before addressing social interaction skills, as deficits in emotional competence frequently contribute to difficulties in peer interactions. Additionally, it suggests that school provides a socially stimulating environment that allows students more opportunities to practice and consolidate social-emotional skills before applying them effectively across various life contexts (Einfeld et al., 2018).

In early development, ASD symptoms may further delay the acquisition of social-emotional skills. Children with ASD often exhibit difficulties in recognizing facial expressions, interpreting emotional situations, regulating emotions, empathizing with others, and imitating emotional expressions (Chevallier et al., 2012; Jones et al., 2018; Samson et al., 2015).

Recent studies have explored the role of robot-mediated interventions, finding that interaction with robots may promote new social behaviors and facilitate emotion recognition and labeling in children with ASD (Soares et al., 2019). These authors suggest that children may find it easier to imitate robots due to their consistent and standardized emotional expressions, in contrast to the variability of human facial expressions, making robots a valuable tool in teaching social-emotional skills.

According to the American Psychiatric Association (2013), emotional dysregulation is implicated in many of the major social and behavioral challenges observed in ASD, ranging from anxiety and social withdrawal to emotional outbursts triggered by deviations from routine. Emotional regulation helps children respond appropriately during social interactions and adapt to novel situations (Gross, 2013; Samson et al., 2015). However, children with ASD may struggle to apply emotion regulation strategies such as seeking social support, problem-solving, or cognitive reappraisal effectively. Jahromi et al. (2013) demonstrated that improvements in emotion regulation predicted greater prosocial engagement among peers and reduced the frequency of emotional outbursts, crises, and aggression in children with ASD.

In typically developing populations, higher emotion regulation capacity has been linked to greater socio-emotional flexibility, increased attention to the social environment, more positive social interactions, and improved communication (Laurent & Rubin, 2004; Prizant et al., 2003). Goldsmith and Kelley (2018) further confirmed that individuals with stronger emotion regulation abilities experience less severe impairments in forming and maintaining friendships, as well as in seeking social interaction. They also note that while cognitive strategies such as reappraisal may be optimal, repetitive behaviors may serve an adaptive function, helping children gain control over overwhelming environments and manage unwanted emotions when used flexibly.

Several models and studies have described how emotions influence social behavior either positively or negatively, depending on the adequacy of emotion regulation and expression. Emotional dysregulation can significantly compromise social success in children with ASD, often resulting in social rejection or exclusion in early school years (Cappadocia et al., 2012).

This literature highlights the need for evidence-based interventions that aim to enhance social-emotional competence. The general purpose of the present study was to design an intervention to

promote and strengthen emotional skills in school-aged children with ASD and to examine, through evidence-based procedures, the impact of these emotional skills on their social competence.

Learning to discuss emotions helps children express their needs, achieve desired outcomes more effectively, and demonstrate an understanding of others. Additionally, learning coping strategies to manage frustration, anger, fear, and sadness provides them with greater resources to handle adversity and establish positive relationships (Di Pietro, 2014). Children and adolescents with autism often experience greater difficulties in recognizing and managing primary emotions. For this reason, the intervention focused on joy, sadness, anger, and fear, which the literature identifies as universal basic emotions experienced and expressed similarly across all human beings. These emotions emerge early in development and serve as a fundamental prerequisite for the acquisition of social skills (Saarni, 1999).

This study aims to investigate whether a psycho-educational intervention designed to improve emotional competence can enhance a child's ability to communicate their emotional needs more effectively, thereby increasing peer interactions and facilitating social approach behaviors.

Method

Participants

A 7-year-old child with a diagnosis of ASD, according to the diagnostic inclusion criteria provided by the DSM-5 (APA, 2013), participated in the present study. The child demonstrated adequate verbal communication skills, responding appropriately in daily interactions and showing overall fluency in basic conversational exchanges.

The participant lives with his parents and his 5-year-old sister. The father is Italian, and the mother is of Eastern European origin. At home, the child is exposed to both Italian and Eastern European languages and cultures. At the beginning of the study, the child was regularly attending the second year of primary school and, once a week, participated in sessions at a center specializing in Applied Behavior Analysis. The intervention aimed to support the acquisition of basic learning skills practical for school tasks, as well as to provide strategies and tools to enhance social competence and emotional regulation.

Before the start of the study, experimenters administered a criteria-based assessment to evaluate prerequisite and complex skills related to reading, writing, and mathematical calculation. The assessment revealed difficulties in reading fluency and writing, particularly with handwriting topography and writing fluency.

Before inclusion in the study, the participant had also begun a psycho-educational group program with another child diagnosed with ASD. However, this peer was not included in the current research due to differences in skill repertoires, learning gaps, and educational goals.

The participant was identified for the study based on his ability to correctly recognize primary emotions while demonstrating difficulty in consistently relating these emotions to personal experiences. He tended to attribute his emotional state to personal situations but struggled to identify and modulate his emotional responses to others' behaviors. In interactions with adults, he appeared generally competent, although he struggled with conversational turn-taking and showed limited tolerance in situations where the focus was not on him. At school, although he was able to complete some tasks independently, he consistently demonstrated difficulties in forming and maintaining peer relationships. When invited, he actively participated in social interactions, but when not directly engaged, he often preferred solitary play.

Dependent variable

The first dependent variable examined in this study was emotional competence, operationalized as the ability to identify and label four basic emotions (happiness, sadness, fear, and anger), correctly associating bodily cues, behavioral indicators, and verbal expressions with each emotion (Saarni, 1999). Emotional competence also encompasses the ability to provide appropriate explanations for others' behaviors and to relate both personal and observed events to corresponding emotional states. We measured (a) the percentage of correctly recognized emotional indicators in the presented videos or spontaneously reported during activities and (b) the percentage of coherent explanations produced and recorded during the psycho-educational training sessions.

The second dependent variable was social competence, measured as the percentage of communicative exchanges with a significant peer. Communicative exchanges included both initiations and responses. Initiation behaviors consisted of asking relevant questions (e.g., "How are you feeling?", "What did you do today?"), making appropriate comments related to the play activity, requesting assistance when facing difficulties (e.g., "Could you help me, please?", "What would you do in this situation?"), proposing solutions to resolve potential problems (conflict resolution), and seeking the presence of the peer to engage in play. Response behaviors included reciprocal conversation (maintaining turn-taking), offering help (e.g., "How can I help you?", "Can I give you a hand?"), and providing appropriate answers to questions posed by the peer or appropriately managing situations where questions were not answered.

Independent variable

The independent variable in this study was a psycho-educational intervention designed to increase the child's ability to recognize four basic emotions in himself and others (happiness, sadness, anger, and fear) and to implement effective coping strategies. The intervention aimed to expand the child's emotional vocabulary, enabling him to label emotions and express his emotional states more effectively. It included activities aimed at teaching the recognition of emotions through bodily indicators, verbal expressions, and observable behaviors. Furthermore, the intervention helped the child understand emotional intensity, enabling them to become aware that individuals may experience different emotions or intensities in the same situation. Ultimately, the intervention fostered problem-solving skills, encouraging the identification of social situations that may pose difficulties and the application of consistent and practical strategies to manage them.

Procedure and Measures

As shown in Table 1, the study consisted of (a) two pre-probes: the first aimed at assessing the child's emotional development to identify specific aspects of emotional competence to target, and the second focused on analyzing the child's strengths and difficulties in communicative exchanges with a significant peer diagnosed with ASD; (b) a psycho-educational training phase designed to strengthen emotional competence; and (c) two post-probes, conducted under the same conditions as the pre-probes, to evaluate treatment effectiveness and its impact on social competence.

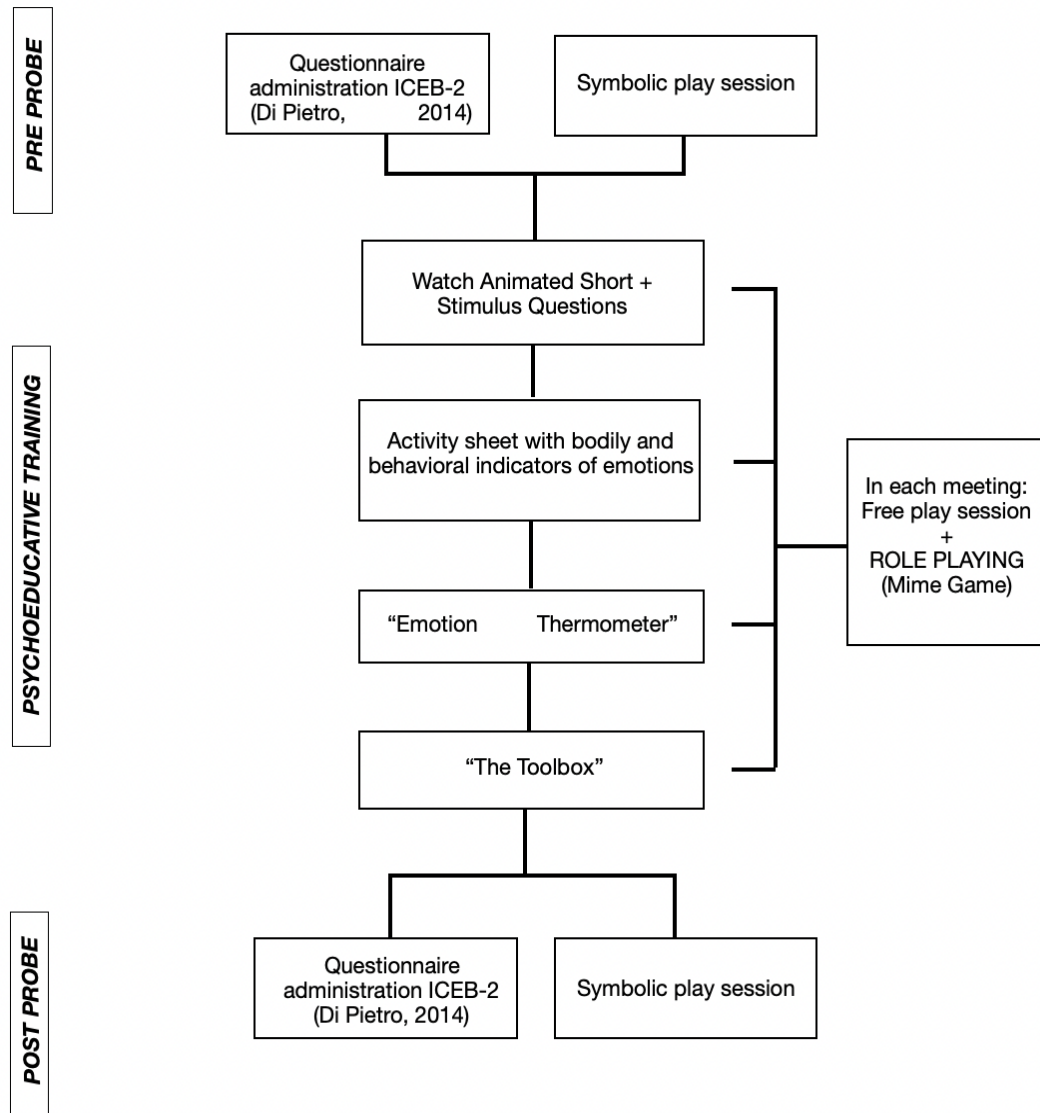
In the pre-and post-probe phases of emotional competence, data were collected using the Basic Emotional Knowledge Interview-2 (Di Pietro, 2014), which was scored from 0 to 4 for each emotional process analyzed based on the correct identification of emotions.

In the pre-and post-probe phases of social competence, data concerned the frequency of specific interaction behaviors during a symbolic play session with a peer. Observations were recorded using an event-recording procedure on a data grid that contained the operational definitions of target social behaviors. The experimenter and a trained assistant recorded the occurrence of these behaviors simultaneously using a checklist during 15-minute sessions, noting the topography of each behavior. Video recordings were also used to review and code spontaneous interaction behaviors, shared play episodes, and other relevant social exchanges. Parental informed consent was obtained for video recording to ensure the children's privacy.

During the psycho-educational training phase, data were collected by the experimenter using a dedicated datasheet that allowed ongoing monitoring of participants' responses (recorded as independent correct answers "+," prompted responses "P," or no responses "-"). This monitoring

enabled the experimenter to make immediate decisions regarding intervention adjustments if difficulties emerged.

Table 1. Flow diagram depicting the different stages of the intervention



During the first meeting, the ICEB-2 (Di Pietro, 2014) was administered individually to assess emotional competence. In the same session, a probe of social competence was conducted in a reserved area of the center, using symbolic play materials (e.g., a dollhouse with multiple characters, a toy car track, and a kitchen play set) to facilitate peer interaction during a 15-minute play session. The experimenter and trained assistant minimized their involvement and observed communicative exchanges using a timer, datasheet, and pencil while video recording the session. Before starting, children were allowed to choose which game to play and could request activity changes by negotiating

with their peers. The game area was arranged to minimize distractions, encourage joint attention, and support natural peer interactions.

The intervention started in the following meeting and consisted of a psycho-educational program on emotional competence, divided into four progressive steps. Sessions were held once a week for three months, each lasting approximately 50 minutes.

In the first phase, the experimenter focused on expanding the child's emotional vocabulary to improve his ability to express his emotional states and recognize emotions in himself and others through bodily, behavioral, and verbal cues. Each session targeted one basic emotion (happiness, sadness, anger, fear), using two animated video clips per session. The child was instructed to signal when he recognized the target emotion, after which the experimenter asked for an explanation based on observed indicators. To assist the child, stimulus questions were provided, and an activity sheet summarizing key emotional indicators (facial, bodily, behavioral, and vocal) was used for further practice.

In the second phase, which also consisted of four sessions, the experimenter introduced the "Emotion Thermometer," designed to help the child identify varying intensities of emotions across different situations. The child was asked to recall personal experiences corresponding to different emotional intensities.

Once this step was completed, the experimenter introduced "The Toolbox," presenting eight practical strategies for managing unpleasant emotions (anger, fear, sadness). The child was encouraged to select additional strategies to enhance coping skills.

Throughout the intervention, at least one free-play opportunity was offered in each session to promote the development of social competence. Social reinforcers and token systems were used to reinforce appropriate behaviors during task execution. At the end of each session, role-playing through a mime game was introduced to strengthen communication, interpersonal skills, listening, and observation of one's own and other's behaviors, using the bodily, behavioral, and verbal indicators addressed during training.

Following the completion of the psycho-educational intervention, two post-probes were conducted to evaluate treatment outcomes. The Basic Emotional Knowledge Interview-2 (Di Pietro, 2014) was re-administered to assess changes in emotional competence. To evaluate social competence, the symbolic play situation with the peer was replicated, and communicative exchanges were recorded using the same observation system employed during the pre-probe phase.

All pre- and post-probe sessions, as well as the training activities, were conducted both in small-group and one-to-one formats within a large room of the Applied Behavior Analysis center equipped with work tables, educational materials, symbolic play objects, board games, a toy kitchen,

puppets, cartoon characters, and toy car tracks. The participant worked in this shared environment alongside other children throughout the study phases.

Results

Figure 1 presents the scores obtained on the Basic Emotional Knowledge Interview-2 (Di Pietro, 2014) before and after the psycho-educational intervention. In both assessments, the child correctly named all four basic emotions and independently identified a specific body location for each one (4/4 in both cases).

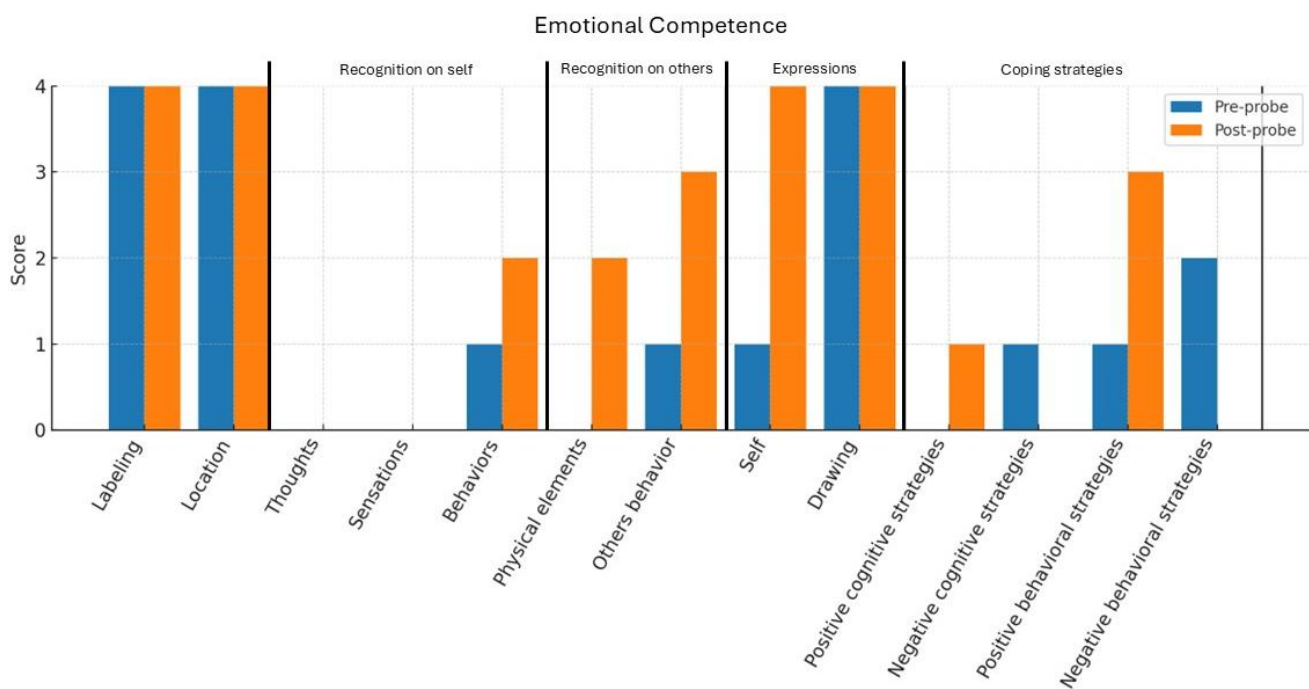


Figure 1. Number of emotions identified (four emotions analysed: happiness, sadness, anger and fear) based on the relative emotional process investigated for the pre probe and post probe respectively

At the qualitative level, post-intervention data indicate a general improvement in the child's narrative ability concerning emotional processes. The child demonstrated progress in recognizing basic emotions, expressing known emotional states more effectively, and using a richer emotional vocabulary to describe them. He was also able to report personal experiences consistent with the emotions investigated (e.g., for fear: "I was walking home and I saw a giant spider. I hid so it would not find me"). Additionally, the child exhibited enhanced expressive capacity, accurately representing each emotion using multiple physiological indicators (facial expressions, body language, and behavior), and provided more detailed drawings (4/4), including specific features such as eyes, lips, eyebrows, and coherent verbal descriptions.

Regarding the recognition of emotions in oneself and others, the post-intervention assessment still highlighted significant difficulties in identifying thoughts (0/4), sensations (0/4), and behaviors (1-2/4) associated with emotional experiences. These aspects were not directly targeted during the intervention due to time constraints and the need for more specific training. However, improvements were observed in recognizing emotions in others based on physical and behavioral cues. The child progressed from 0 to 2/4 in recognizing physical indicators (e.g., "I recognize that he is happy when he smiles," "I recognize that he is sad when he lowered his head, and his eyes are full of tears") and from 1 to 3/4 in behavioral indicators (e.g., "He has a happy face," "He hugs me," "I recognize that he is angry when he pumps his fist").

Concerning emotional regulation, the child continued to experience difficulties in employing cognitive coping strategies to manage unpleasant emotions such as anger, fear, and sadness. Positive cognitive strategies increased slightly from 0 to 1/4, with isolated examples of functional thinking (e.g., "Monsters go away, I am not afraid of you") and a reduction in avoidance-oriented responses to anger. Conversely, positive behavioral strategies increased from 1 to 3/4, including asking for help from parents, turning on the light, and hugging a teddy bear. In contrast, negative behavioral strategies (e.g., venting, running away) decreased from 2 to 0 out of 4.

Data collected during the training phase revealed a progressive improvement in identifying emotions both during video observations and related activities. For example, the child identified eight out of ten episodes of anger and six out of ten episodes of sadness and provided coherent explanations supported by physiological and behavioral indicators (e.g., seven out of ten correct explanations for anger). Furthermore, during the role-playing activities in the final two sessions, the child demonstrated substantial gains, achieving 100% accuracy in the mime game, which reflected mastery in both mimicking emotions and observing emotional cues in others' behavior.

Table 2 presents the data grid from the symbolic play sessions with a peer, reporting the number of communicative exchanges and play modalities recorded during the pre-and post-probe sessions (each 15 minutes long). During the pre-probe, a total of 33 communicative exchanges were observed, with parallel play predominating. Following the probe, communicative exchanges increased to 56 occurrences, accompanied by a higher frequency of social play interactions.

Table 2. Social competence data collection grid

Social competence	Pre probe	Post probe
Ask relevant questions	✓✓✓✓✓✓	✓✓✓✓✓✓✓✓✓✓
Makes comments appropriate to the situation	✓✓✓✓	✓✓✓✓✓✓✓✓✓✓
Ask for help	✓	✓
Proposes solutions to problems (conflict resolution)		✓✓✓✓✓
Seeks the presence of the other to play	✓	✓✓✓✓
Offer help		✓✓✓
Reciprocity of conversation (Respect turn-taking)	✓✓✓✓✓✓✓✓✓✓✓✓	✓✓✓✓✓✓✓✓✓✓✓✓✓✓✓✓
Answer questions appropriately	✓✓✓✓✓	✓✓✓✓✓✓✓✓✓✓✓✓
TOT: 28		TOT: 56
Game Modes	Parallel game and solitaire game	Social play and solitary play

Figure 2 presents the cumulative percentage data for the individual behavioral instances related to social competence before and after the psycho-educational intervention. The results indicate a general improvement in the child's social competence following the intervention. Specifically, during the post-intervention symbolic play sessions, the child demonstrated an increased frequency of initiating questions directed to the peer and appropriately responding to social requests, with occurrences rising from 5 to 10.

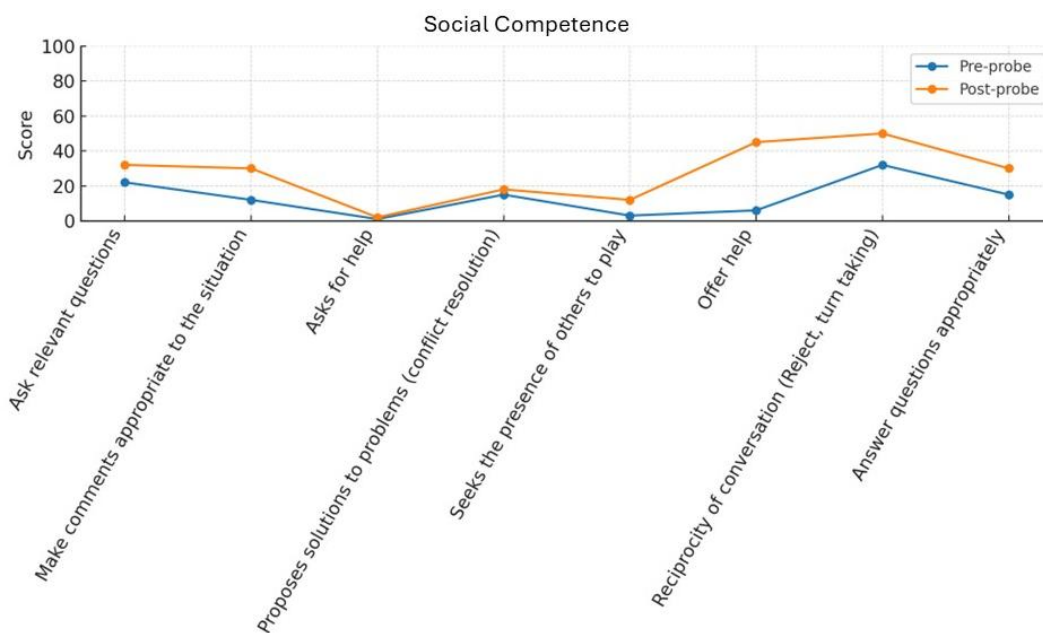


Figure 2. Cumulative data % of the number of occurrences of the different behaviors examined for social competence in the pre- and post- probe sessions

Additionally, the child showed greater efforts to seek peer attention when transitioning from social play to solitary play, with the frequency of occurrences increasing from 1 to 4. The child also displayed a higher level of engagement in proposing solutions to address emerging social problems during interactions.

Discussion

The present study aimed to evaluate the promotion and strengthening of emotional competence in a 7-year-old child diagnosed with ASD. The initial assessment highlighted the need to expand the child's emotional vocabulary by incorporating additional bodily, behavioral, and verbal indicators, as well as addressing difficulties in reporting personal experiences related to emotions and in attributing emotional states to self and others. Furthermore, the study investigated whether teaching specific emotional skills using evidence-based procedures would also impact the child's social competence.

To achieve these objectives, a psycho-educational intervention was implemented, combining social reinforcement and token economy procedures during the execution of various activity sheets and role-playing sessions designed to promote communication, listening, and observational skills.

Post-intervention data from the ICEB-2 (Di Pietro, 2014) revealed a general improvement in the child's narrative and expressive abilities related to emotional processes, thereby enhancing his capacity to communicate emotional experiences more effectively. These findings are consistent with Di Pietro (2014), who emphasizes that learning to recognize and verbalize emotions helps children express their needs more appropriately, facilitates goal attainment, and supports mutual understanding in social interactions.

Additionally, the child showed increased use of positive behavioral coping strategies, such as asking parents for help, engaging in comforting behaviors (e.g., hugging a pet or turning on the light), and initiating play with peers. Overall, these results suggest a general improvement in emotional competence, as supported by the data collected during the training sessions, although highly significant changes were not observed.

In terms of social competence, post-intervention data from the symbolic play sessions indicated a positive increase in communicative exchanges and social interactions with peers. The child demonstrated a greater understanding of others' mental states, responded more appropriately to social requests, offered assistance more frequently, and actively proposed solutions for resolving conflicts. Although the intervention was of limited duration, these improvements suggest promising potential, in line with previous research findings.

The results underscore the importance of directly teaching social interaction skills while also emphasizing the need to address deficits in emotion recognition and regulation as prerequisite competencies, as these difficulties often contribute to impaired peer interactions (Einfeld et al., 2018). Furthermore, as highlighted by Jahromi et al. (2013), interventions targeting emotion regulation in children with ASD may predict increased emotional and social competence, including greater prosocial engagement and reduced occurrences of anger, crises, and aggression.

Anecdotal observations further support the social relevance of the intervention. The participant increased his spontaneous interactions with peers outside of probe sessions, greeting them, waiting together before starting activities, and jointly deciding which game to play. However, the present results do not yet allow for a comprehensive evaluation of the procedure's long-term effectiveness due to the absence of follow-up assessments.

Limit of the research and future prospective

This study has several limitations. First, the research involved a single participant, and the duration of the intervention was limited, which may have restricted the child's opportunity to develop and consolidate the targeted skills fully; this is consistent with the observations of Einfeld et al. (2018), who emphasize the need for extended practice to allow children to stabilize their social-emotional abilities and generalize them across different life contexts.

Another limitation concerns the use of the ICEB-2 as the sole assessment tool for evaluating emotional competence, as well as the experimenter's exclusive reliance on behavioral scripts to assess social competence. A more detailed analysis could have been conducted by breaking down the emotional competencies targeted in psycho-educational training into multiple subcomponents, allowing for a more comprehensive assessment of the various dimensions involved. Additionally, administering further probes with different peers would have provided a broader evaluation of the child's social competence and the possible presence of other behavioral difficulties or newly acquired skills. Future studies could replicate and extend this research to include a larger sample of participants and different settings. Moreover, incorporating follow-up assessments would enable the evaluation of the long-term maintenance of the acquired skills and their generalization across time and various social contexts.

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Declaration of Interest statement

Declarations of interest: none

Authors' contribution

All authors contributed to and have approved the final manuscript

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