

The Facilitation of Social-Emotional Understanding and Social Interaction in High-Functioning Children with Autism: Intervention Outcomes

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This study evaluated the effectiveness of a 7-month cognitive behavioral intervention for the facilitation of the social-emotional understanding and social interaction of 15 high-functioning children (8 to 17 years old) with autism. Intervention focused on teaching interpersonal problem solving, affective knowledge, and social interaction. Preintervention and postintervention measures included observations of social interaction, measures of problem solving and of emotion understanding, and teacher-rated social skills. Results demonstrated progress in three areas of intervention. Children were more likely to initiate positive social interaction with peers after treatment; in particular, they improved eye contact and their ability to share experiences with peers and to show interest in peers. In problem solving after treatment, children provided more relevant solutions and fewer nonsocial solutions to different social situations. In emotional knowledge, after treatment, children provided more examples of complex emotions, supplied more specific rather than general examples, and included an audience more often in the different emotions. Children also obtained higher teacher-rated social skills scores in assertion and cooperation after treatment. The implications of these findings are discussed in terms of the effectiveness of the current model of intervention for high-functioning children with autism.

KEY WORDS: High-functioning autism; social-emotional understanding; social interaction; cognitive-behavioral intervention; social problem solving; affective education.

INTRODUCTION

Social impairments—abnormalities in reciprocal social interaction and difficulties in emotional expression and recognition—are considered to be among the core deficits associated with the autistic syndrome (American Psychiatric Association, 1994; Volkmar, Carter, Grossman, & Klin, 1997). Indeed, these difficulties span development stages, regardless of cognitive abilities. However, recently, more attention has been focused on the study of the unique social-emotional characteristics of children with autism who have nor-

mal intelligence. This subgroup of children can engage in a higher level of social relationships and more complex emotions compared with low-functioning children with autism, probably due to fact that the former at least partially compensate for their social deficit by utilizing their relatively high cognitive abilities (Hermelin & O'Connor, 1985; Kasari, Chamberlain, & Bauminger, 2001; Sigman & Ruskin, 1999).

Recent research identified difficulties in social initiation and in social-emotional understanding as the major problems of high-functioning children with autism, rather than social insensitivity or social disinterest (Bacon, Fein, Morris, Waterhouse, & Allen, 1998; Sigman & Ruskin, 1999). These children are caught in a vicious circle of social isolation. On the one hand, they have a desire to be socially involved with

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their peers and express loneliness and depression in the absence of such relationships. On the other hand, they have poor friendships and do not know how to adequately interact with their peers due to limited social and emotional understanding and experiences (Bauminger & Kasari, 2000; Hobson, 1993; Wing, 1992). In particular, high-functioning children with autism evidence difficulties in social cognition and in reciprocal peer interaction.

SOCIAL COGNITION

Social cognition includes the child's ability to spontaneously read and correctly interpret verbal and nonverbal social and emotional cues; the ability to recognize central and peripheral social and emotional information; the knowledge of different social behaviors and their consequences in diverse social tasks (e.g., how to initiate a conversation, how to negotiate needs, how to make group entry); and the ability to make an adequate attribution about another person's mental state (i.e., "theory of mind" abilities) (Crick & Dodge, 1994). Although clinical experience exceeds empirical knowledge concerning most social cognitive capabilities, the areas of (a) emotion recognition, (b) the ability to discriminate central social stimuli from peripheral stimuli in social situations, and (c) theory of mind capabilities have all been empirically explored in high-functioning children with autism.

Emotion recognition is defined as the child's ability to distinguish the various affective expressions in facial, gestural, and verbal displays, in oneself and in others, and to understand their social-contextual meaning (Buitelaar, Van der Wees, Swaab-Barneveld, & Van der Gaar, 1999). Children's understanding of basic emotions—happiness, sadness, anger, fear—and of socially complex emotions such as embarrassment, empathy, loneliness, surprise, or pride was tested in a number of studies on high-functioning children with autism (e.g., Bacon *et al.*, 1998; Bauminger & Kasari, 2000; Bormann-Kischkel, Vilsmeier, & Baude, 1995; Buitelaar *et al.*, 1999; Capps, Yirmiya, & Sigman, 1992; Jaedicke, Storoschuk, & Lord, 1994; Kasari, Chamberlain, Paparella, & Bauminger, 1999; Loveland *et al.*, 1997). Overall, high-functioning children performed well on the recognition of simple emotions, when these emotions were either explicitly or implicitly presented in different stimuli (e.g., Capps *et al.*, 1992; Loveland *et al.*, 1997). However, they exhibited difficulties in explaining the causes of simple and complex emotions (e.g., surprise). Moreover, these children

experienced an incomplete understanding of socially complex emotions, which are compounded with social understanding of cultural norms, conventions, and rules of behavior (e.g., in guilt); with the ability to reflect on the self *vis-a-vis* others (e.g., embarrassment); as well as with the ability to take responsibility for one's own behavior (e.g., pride). Compared with typically developing control groups, high-functioning children with autism have demonstrated a narrower repertoire of complex emotions were able to provide only more scripted, general examples of complex emotions; were less likely to include an attribution to an audience in their examples; and required a longer duration and more prompts to generate an example of a complex emotion. In addition, they tended to rely on and implement cognitive strategies and terms (e.g., "I think") in the process of recalling examples of complex affects (see review in Kasari, Chamberlain, & Bauminger, 2001). Altogether, high-functioning children need help in broadening their repertoire of emotions and in linking emotions with different social situations.

Another social cognition problem among high-functioning children with autism consists of their tendency to pay more attention to peripheral details, particularly physical characteristics involved in a social situation, rather than to the attribution of social meanings to social stimuli. For example, in Bauminger and Shulman (2001), high-functioning preadolescents and adolescents with autism tended to describe physical details of a picture depicting two friends sharing secrets together (e.g., close proximity, children's activities, the color of the children's clothing), rather than describe these children as close friends. In another recent study, Klin (2000) also demonstrated less social sophistication in the understanding of cartoon figures among high-functioning children with autism. These children were less sensitive to social elements, used considerably fewer affective terms, and were less able to derive personality features from characters' actions, in comparison with a nondisabled control group. It remains unclear as to whether this problem stems from a lack of social understanding and knowledge related to social norms and conventions and/or from problems in information processing that requires taking the whole Gestalt into consideration rather than its particular elements (i.e., the central coherence hypotheses, Frith, 1989). However, it is clear that high-functioning children with autism need help both in understanding social norms and rules (Kunce & Mesibov, 1998) and in processing social information (Attwood, 1998). Intervention should thus focus on facilitating the child's social understanding capabilities, teaching the ability to

read social cues in different social situations; enhancing the capacity for making accurate social interpretations, and expanding the child's repertoire of behavioral alternatives for different social tasks (Siegel, Goldstein, & Minshew, 1996).

Theory of mind, the ability to attribute mental states (e.g., beliefs, desires, intentions, and emotions) to other persons and to predict behavior accordingly, is another domain of social cognition in which high-functioning children with autism evidence mixed capabilities. Recent findings have demonstrated that these children perform well on theory of mind tasks at different levels of complexity. For example, they showed relatively high performance on second order false-belief tasks such as Perner and Wimmer's (1985) John and Mary task (Bauminger & Kasari, 1999; Dahlgren & Trillingsgaard, 1996). However, they performed less well when presented with more naturalistic theory of mind stories that more closely resembled real life (e.g., Happe's 1994 "strange stories") and also when applying theory of mind attributions in their actual social functioning (Ozonoff & Miller, 1995). Theory of mind was not explicitly targeted by the current study's social-emotional intervention, yet several implications in this research domain appear significant. It seems that high-functioning children with autism have only a partial understanding of other people's mental states and that this knowledge is not spontaneously translated into daily social interactions with peers. Consequently, intervention programs should establish two main goals: first, to broaden the child's understanding of other children's mental states' and, second, to mediate and directly guide the child in applying this knowledge to enhance reciprocity in daily social interactions (Howlin, 1998). (See Baron-Cohen and Swettenham, 1997, for a thorough review of the extensive body of research on theory of mind.)

SOCIAL INTERACTION WITH PEERS

Social interaction is defined as a reciprocal process in which children effectively initiate and respond to social stimuli presented by their peers (Shores, 1987). It is well documented that the social participation of children with autism in peer interaction is low in frequency and poor in quality, composing, for example, more ritualistic behaviors and poor social behaviors such as only maintaining close proximity, rather than performing prosocial behaviors such as sharing feelings and experiences (Sigman & Ruskin, 1999). The study of how high-functioning children with autism interact

with their peers in natural settings is fairly limited (Lord & Magill-Evans, 1995). However, cognitive abilities, specifically verbal abilities, have been linked with social initiations and social responsiveness in children with autism (Hauck, Fein, Warehouse, & Feinstein, 1995; Sigman & Ruskin, 1999; Stone & Caro-Martinez, 1990). Thus, high-functioning children with autism are more likely to initiate or respond in peer interaction compared with low-functioning children with autism. Yet, the former group still differs in quality and frequency of behavior compared with typically developing children (Lord & Magill-Evans, 1995) or with high-functioning children having developmental delays (Sigman & Ruskin, 1999). Interestingly, Sigman and Ruskin found that children with autism were as able as the children with developmental delays to maintain interactions once these interactions had begun. However, high-functioning children with autism spent equal time in high-level play and in solitary activities, whereas children with developmental delays preferred to be engaged in social activities rather than in solitary play or nonsocial activities. An implication for intervention is the need to increase the frequency and quality of social initiations achieved by high-functioning children with autism.

SOCIAL-EMOTIONAL INTERVENTION

Despite the fact that high-functioning children with autism reveal difficulties in the aforementioned areas of social competence, social cognition and social interaction, interventions to date that aimed to facilitate the social competence of this population have been limited in several ways. First, only recently have studies emerged that focus exclusively on the specific needs of high functioning children with autism (Rutter, 1996). Second, for many years, research in this area has generally emphasized only the peer interaction aspect of social difficulties (Rogers, 2000). Social interaction was mainly taught via social skills training using peers and/or teachers as the trainers (see review in Simpson, Myles, Sasso, & Kamps, 1997). More recently, a few studies have focused on facilitating social cognitive abilities such as the "theory of mind" (e.g., Hadwin, Baron-Cohen, Howlin, & Hill, 1997; Ozonoff & Miller, 1995; Swettenham, 1996) and social understanding (e.g., in Gray's 1998 social stories paradigm). Even fewer studies addressed the enhancement of emotional knowledge, and these usually emphasized the simple emotions and included participants who were not high functioning (e.g., Hadwin, Baron-Cohen, Howlin, &

Hill, 1996). In general, these interventions resulted in success in the learned domains, but children failed to transfer and implement their newly acquired abilities to other domains of social competency that were not directly taught.

The present study examined the efficacy of an intervention program designed exclusively for high-functioning children with autism, which aimed to promote both children's social cognition (including emotional understanding) and social interaction with peers. This study contributes to the existing literature on interventions for high-functioning children with autism in at least five important ways, including (a) its focus on enhancing an integrative social competence in high-functioning children (social cognition, emotional understanding, and social interaction); (b) the high verbal IQs of all its participants; (c) its long-term (7-month) methodology; (d) its implementation in the children's natural school environment; and (e) its ecological model (Bronfenbrenner, 1979, 1992) that involves the child's teacher, parents, and a peer in the training process.

As its conceptual framework, the current intervention adopted cognitive behavioral therapy. Based on this framework, social competence is perceived as a multidimensional concept, which assumes reciprocity between the ways an individual thinks, feels, and behaves in social situations (Hart & Morgan, 1993; Kendall & Panichelli-Mindel, 1995). In line with this approach, the present intervention maintained three basic theoretical assumptions: (1) interpersonal cognitive processes and emotions *can mediate* interpersonal behavior; (2) social problem solving and recognition of emotions *can be taught* cognitively and *can influence* behavior; and (3) social problem solving and a more comprehensive understanding of emotions *can lead* to later successful social adjustment (Hart & Morgan, 1993; Shure, 1981).

Two basic methods of cognitive behavioral therapy form the basic technique used in the current intervention, and they hold particular significance for high-functioning children with autism. Training in *social-interpersonal problem solving* emphasized social cognitive abilities such as the child's ability to read and correctly interpret external social cues (e.g., body posture or facial expression) as well as internal ones (e.g., feelings, sensations), the social knowledge of behavioral alternatives to different social situations, the ability to consider the anticipated results of various social alternatives, and the capacity to experience different behaviors in real-life situations (Kendall & Braswell, 1993). Training in *affective education* fo-

cused on expanding children's affective repertoire, fostering children's recognition of emotions in themselves and others, and helping children associate between a given social situation and the emotion it elicits (Kendall & Braswell, 1993).

This study aimed to explore whether high-functioning children with autism would demonstrate improvements after treatment in: their ability to solve social problems, their emotional understanding, and their social interaction abilities with peers.

METHODS

Participants

Children were included in the intervention based on four conditions. (1) They met the Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV*) criteria for autism (American Psychiatric Association, 1994). (2) They met the Autism Diagnostic Interview-Revised (ADI-R) criteria for autism (Lord, Rutter, & Le Couteur, 1994). (3) They had a verbal IQ of 69 or above. (4) Consent was obtained from their educational supervisors, school principals, classroom teachers, and parents for their participation in the program. Of 25 children recruited through the Special Education Department in the Israeli Ministry of Education, 10 children excluded from the study: 5 because they had a clinical diagnosis of PDDNOS according to the *DSM-IV* (American Psychiatric Association, 1994) and 5 because their verbal IQ was lower than 69. The final sample included 15 high-functioning children with autism (4 girls, 11 boys) between the ages of 8.08 and 17.33 years ($M = 11.25$, $SD = 26.57$). Mean IQ scores for the autistic children, as measured on the WISC-R (Wechsler, 1974), were $M = 81.36$ ($SD = 12.85$) for the full scale, $M = 84.87$ ($SD = 12.33$) for the verbal scale, and $M = 88.20$ ($SD = 25.00$) for the performance scale (Table 1). All children had a verbal IQ of 69 or above; however, two children obtained low-perfor-

Table 1. Participants' Age and IQ Scores ($n = 15$)^a

Variable	M (SD)	Minimum	Maximum
Chronological age (in years, months)	11.25 (26.57)	8.08	17.33
Full-scale IQ ^b	81.36 (12.85)	60	109
Verbal IQ	84.87 (12.33)	69	106
Performance IQ	88.20 (25.00)	48	138

^a Values given as M (SD).

^b IQ scores are derived from the WISC-R (Wechsler, 1974).

mance IQ scores (56 and 48). These two children were included in the study for several reasons. (1) The intervention was based on verbal rather than performance abilities. (2) Both of the children had verbal IQ scores higher than 70 (95 and 77, respectively). (3) One child had a full-scale IQ scores within the high functioning level (FIQ = 74).

In terms of diagnostic criteria, all 15 children met the criteria for autistic disorder outlined in the *DSM-IV* (American Psychiatric Association, 1994), including (a) onset before 36 months of age, (b) qualitative impairment in social interaction, (c) qualitative impairment in communication (e.g., deficits or abnormalities in language development or deficits in play, particularly symbolic play), and (d) restricted and repetitive stereotyped behaviors, which may include bizarre responses to various aspects of the environment, such as resistance to change. These 15 children also met the criteria for autism on the ADI-R (Lord, Rutter, & Le Couteur, 1994), which was administered to the children's parents by the author, to verify diagnosis and to provide additional information about the children's developmental histories. The ADI-R is a standardized investigator-based interview. It is administered to the individual's primary caregiver by a trained interviewer. Based on the ICD-10 criteria (World Health Organization, 1990) for autism, the ADI-R emphasizes detailed descriptions of behaviors that focus on developmental deviance rather than on developmental delay. The ADI-R focuses on meeting criteria for autism in three main areas; reciprocal social interaction, communication and language, and repetitive, restrictive, and stereotyped behaviors. The child also needs to show evidence of developmental delay or deviance before the age of 36 months. All 15 children met all three ADI-R criteria for autism and evidenced developmental delay before 36 months.

The participants attended four regular educational settings and one special education setting dispersed throughout the country. All children (but one) were already fully included in regular education at least 1 year before the beginning of the intervention. One child (among the highest functioning children) was placed in a special education school for children with mild mental retardation according to his parents' preference. The children came from middle-class families in large urban areas throughout Israel.

Assessment Measures

In line with the intervention objectives, two basic levels of assessment were executed in the current project. First, to assess changes in social cognition and

emotional understanding, a problem solving measure and an emotion inventory were utilized, respectively. Second, to assess overt social functioning, observations of social interaction were used to assess changes in the child's actual social behavior, and teacher reports on students' social skills were employed. All of the measures were administered both before and immediately after the treatment.

Measures to Assess Change in Social Cognition and Emotional Understanding

Problem-Solving Measure. The problem-solving measure (PSM) developed by Lochman and Lampron (1986) is a frequently used behavioral interview designed to examine both children's problem solving skills and the cognitive reasoning behind their problem solving processes. For the purpose of the present study, to measure changes in social problem solving due to treatment, nine hypothetical social problems (e.g., initiating conversation, giving help, sharing, solving a conflict) were developed. Based on Lochman and Lampron's PSM, each story in the current study contained only a beginning and an end. The child was asked to compose the body of the story and was invited to suggest a number of different alternatives for each story. For example: "Gal loves to play cards during recess time. But he can't play cards by himself. It's recess time and Gal is thinking what he can do. The story ends with Gal enjoying playing cards." The child was asked to tell what happened from the time that Gal wanted to play cards until the time he was already playing. The middle of the story provided by the child divulges possible solutions to the given problems.

The PSM stories were designed to differ from the vignettes taught in the intervention in two major ways. (1) In the PSM, children were asked to compose the middle of a story with a given ending, requiring the children to present an understanding of the reasoning behind the given ending to the problem, whereas the problem-solving intervention trained children to compose the ending to the story themselves. (2) The PSM stories differed in content from the problem-solving intervention's curriculum. For example, one PSM story focused on coping with teasing, whereas the intervention's social scenarios did not include this topic.

The PSM stories were successfully piloted on 10 typically developing children of the same ages as the children in the current project, who were able to provide various relevant social solutions to the different social problems. The same nine hypothetical social problems were given to the children before and after the intervention.

Based on Lochman and Lampron's PSM, the scoring procedure included five basic evaluation categories: activity, relevance, number of solutions, variety, and content. First, to evaluate active versus passive solutions, children's responses were scored as active (1) if active steps were performed by the story character to solve the problem (e.g., Gal asks the other child if he wants to play cards with him), but were scored as passive (0) if the problem resolved itself (e.g., the children started to play). Second, the relevance category indicated if the proposed solution led to the given story ending. Children's answers were scored as relevant (1) or irrelevant (0). Third, the total number of solutions proposed by the child for each story was scored. Fourth, the variety category reflected the number of different content areas offered in the child's response. Fifth, the content area description category suggested the following seven different content areas for children's solutions: help seeking, giving help, nonconfrontation, verbal or physical aggression, direct social verbal solution, direct social action, and direct nonsocial action. Due to low frequencies in preliminary analyses of each of the different content areas in children's responses, the seven content dimensions were combined into the following three main categories: a *help* category composed of help seeking and help giving, a *social* category composed of direct social verbal solution and direct social action, and a *nonsocial* category composed of nonconfrontation and direct nonsocial action. Appendix A describes these content categories and provides examples of responses. Children's aggressive responses (i.e., solving the problem by offering physically or verbally aggressive solutions such as "Dan grabbed the ball from Gal and ran away") were too few to be included in the analyses; therefore, this category was excluded. To calculate interrater agreement, two raters independently coded a randomly selected 40% of children's responses. Interrater agreement was 100% for the active-passive category, 100% for the relevance category, and 95% for content analysis.

Emotion Inventory. The emotion inventory (Seidner, Stipek, & Feshbach, 1988) measured the child's experience and understanding of 10 simple and complex emotions, such as happiness, sadness, guilt, and pride. Each child was asked to define the emotion and to tell about a time in which she or he felt each emotion. This measure has been successfully used for high-functioning children with autism (e.g., Bauminger & Kasari, 2000; Capps *et al.*, 1992, Capps, Sigman, & Yirmiya, 1995).

Based on the system developed by Seidner *et al.* (1988), the examples given by the children were ana-

lyzed according to three dimensions: knowledge, audience, and general versus specific. The knowledge dimension constitutes the number of emotions that the child recognizes and describes. Regarding the audience dimension, the understanding of complex emotions such as guilt or embarrassment requires the reflection of another person observing oneself. (For example, a boy slipping on a banana might feel sad or hurt in an empty room but would feel embarrassed if this occurred during physical education class with all his classmates watching.) Thus, an explicit statement that included an audience who observed the emotion was given a score of 2 (e.g., for embarrassment, "Once when I had to talk in a school ceremony in front of all of the school's students and teachers . . ."). A score of 1 was given to an implicit statement that reflected the notion of an audience (e.g., for guilt, ". . . when I'm blamed for not preparing homework in English"), and a score of 0 was given to the absence of an audience (e.g., for embarrassment, "I feel embarrassed when I'm suddenly confused"). Regarding the general versus specific examples dimension, general responses (scored 1) include those referring to a broad, stereotypical type of experience (e.g., for loneliness, ". . . when you're alone at home"), whereas specific responses (scored 2) suggested that the child had a particular, possibly personal experience in mind (e.g., for guilt, "Yesterday, when I mistakenly broke one of my sister's favorite shells").

To calculate interrater agreement for the coding of the audience and general versus specific dimensions on each of the emotions, two raters independently coded a randomly selected 40% of children's examples. Interrater agreement for the audience dimension was 100% for 8 of the 10 different emotions (except loneliness [84%] and jealousy [66%]). For the general versus specific dimension, interrater agreement was 100% for all but one of the emotions (happiness [84%]). All disagreements were discussed until the raters reached agreement.

The same simple and complex emotions were tested before and after the treatment. It should be emphasized that the affective education module in the intervention did not directly teach the three skills measured by this emotion inventory scale: identification of complex emotions, use of specific personal examples, or inclusion of an audience. The intervention curriculum taught only simple emotions directly, whereas complex emotions were implicit (see Appendix B). In addition; children were not explicitly taught either to provide more personal examples or to include an audience in their examples.

Measures to Assess Change in Actual Social Behavior and Manifest Social Skills

Observations of Social Interaction. To assess change in children's social behaviors, children were observed interacting with peers other than their assigned peers during school recesses for two 15-minute periods before treatment and for two 15-minute periods after treatment. In most cases, the observations were conducted on four different days. For each 15-minute period, a single child's social behavior was recorded. The observer watched the child's behaviors for 50 seconds and then recorded them for 10 seconds. Two observers underwent training in observing high-functioning children with autism who were not associated with the current project, over a period of 2 weeks, until an interobserver agreement level of 85% was obtained. Then one observer, a female graduate student in special education, observed the entire sample, before treatment and seven months later immediately after the intervention ended. The observer knew that the children were undergoing social skills training. She maintained close proximity to the children during recess and snack time, whether in their classes or outdoors; however, she did not interact with children and politely rejected any overture made toward her. Children were told that the observer was interested in learning about their play habits.

A coding scale was developed based on Hauck *et al.*'s (1995) Behavior Coding Scheme for children with autism. This scheme was designed for observations in the child's natural school environment, and it coded social initiations in three main behavioral categories: positive social interaction, negative social interaction, and low-level social interaction. For the purpose of the present study, the coding scale was adapted to suit high-functioning children with autism. Two modifications were executed. (1) The scale was extended to include not only social initiations but also social responses. (2) Each of the three behavioral categories was expanded to include a broader variety of prosocial and aggressive behaviors appropriate to the higher social abilities of the current participants in comparison with Hauck and her colleagues' project. Behaviors such as sharing experiences and objects, giving help, and making/responding to social communication were added to the positive interaction scale. Teasing and controlling were added to the negative interaction scale. Functional communication and idiosyncratic language were added to the low-level interaction scale. Appendix C presents a description of the observation categories and behaviors.

Social Skills Ratings. The Social Skills Rating Scale—Teacher Version (SSRS-T; Gresham & Elliot, 1990) is a widely used scale for teachers' ratings of their students' overall social skills. This questionnaire has also been used for high-functioning children with autism in Ozonoff and Miller's (1995) intervention study. The SSRS-T encompasses the following three social skills subscales rated on a 3-point frequency scale (often true, sometimes true, never true): *Cooperation* with 10 items such as "uses free time in an acceptable way," "ignores peer distractions when doing class work," "easily makes transition from one classroom activity to another" ($\alpha = .87$); *Assertion*, with 10 items such as "volunteers to help peers with classroom tasks," "invites others to join in activities," "joins ongoing activity or group without being told to do so" ($\alpha = .80$); and *Self-Control*, with 10 items such as "control temper in conflict situations with peers," "compromise in conflict situations by changing own ideas to reach agreement," "gets along with people who are different" ($\alpha = .83$).

Social-Emotional Intervention

Procedure

In line with an ecological treatment model, the current intervention was conducted by the child's main teacher in the school, in conjunction with a typically developing peer and the child's parents. Each participant's individual education plan included work on the intervention curriculum (see later) for 3 hours per week over a 7-month period in class with the teacher. In addition, to practice the learned social skills, each participant met with his or her assigned peer twice weekly during that period: one day after school and during one school recess (see description of peers' role later). To support and motivate their child, parents also were involved for the entire interval (see parents' role later).

Curriculum

The intervention content consisted of an adaptation of Spivack and Shure's (1974) Interpersonal Problem Solving Model (see their book for a broad description of their program) and of Margalit and Weisel's (1990) *I Found a Solution* social skills program. The intervention curriculum consisted of three sections: (a) instruction in prerequisite concepts such as what a friend is, why it is important to listen to a friend, how we listen to a friend, in what ways friends are alike or different, etc.; (b) affective education—teaching simple emotions (sad, happy, afraid, angry)—

by describing the rule for each emotion; teaching how to identify the emotion in oneself and in others through the recognition of facial expressions, gestures, and vocalizations; and teaching how to identify the emotions in social situations; and (c) social-interpersonal problem solving, where children were trained to improve 13 main social initiations such as initiating a conversation with a friend, comforting a friend, and sharing experiences with a friend. Three social problem vignettes were composed for each of the 13 social-interpersonal goals, using training scripts adapted from Spivack and Shure's model to fit the age and language characteristics of the high-functioning children with autism. Each of the 13 social skills was taught in the classroom by the child's teacher via its three social vignettes and was practiced with the assigned peer and were supported by the parents at home. Appendix B presents an example of the social problem-solving model for one social goal. (A full description of the intervention program can be obtained from the author.) Affective education was also combined within the social-interpersonal problem-solving model when teachers asked the children to think of the emotions that might be elicited in each of the social situations described in the social problem vignettes.

Teachers

Teachers had several roles in the intervention: (a) teaching the social problem model and the affective education module in the allotted 3 hours per week; (b) selecting, supporting, and guiding an assigned peer for each child participating in the training; and (c) informing the child's parents and the child's assigned peer about the targeted social skill that should be practiced with the child with autism. The author and a research coordinator trained teachers during the summer before the school year when the intervention was conducted. The training process included theoretical background about the unique social-emotional characteristics of high-functioning children with autism. In addition, teachers were trained through experiential learning to implement the social-interpersonal problem solving technique and the affective education module. Throughout the whole intervention period during the school year, the author and research coordinator individually supervised teachers at school, once or twice monthly.

Peers

Each of the 13 social skills taught through the problem-solving model was practiced with an assigned

peer. For example, when taught cooperation, the children with autism had to design and experience an activity that required cooperation with their assigned peer (e.g., composing a script for pretend play and acting it out, making pizza together). Each child met with the peer twice weekly, during one school recess, and one afternoon. These peer meetings offered structured opportunities to experience social activities during school time and after school, consistently with the same peer, and to practice learned social skills. Two main principles were emphasized in peers' work: reciprocity and continuity. To enhance reciprocity, the pairs of children were guided by the teacher to select social activities that were pleasant for both children. Continuity was heavily emphasized in implementing the learned task. For example, in the first week, the children with autism were instructed to make telephone calls to their assigned peers to practice initiating conversation with a peer. However, during the following weeks, as other, new social skills were taught (e.g., initiating social activity with a peer), the children were guided to continue making telephone calls to one another.

Parents

Parents received an explanation about the intervention curriculum and procedure during the summer before the school year, by the author and a research coordinator. Parents' role was to motivate and support their child in the process of practicing the learned social skills with the assigned peer. The teacher contacted the parents in writing each week using the child's notebook devised for that purpose. The teacher reported about the social skills learned that week and informed parents about the social activity that the child was requested to implement (e.g., calling a friend on the telephone, inviting a friend over) for the following week. Parents helped their child implement each social goal at home with the assigned peer by suggesting ideas for social activities, by physically bringing the assigned peer to their home, by helping their child to find conversational subjects for a telephone call, and so on. Parents could consult the teacher freely for guidance.

RESULTS

The results are presented in line with the two main domains of study: change in children's social and emotional understanding, and change in children's observed social interactions and overall social skills.

Social Understanding: Performance on the Problem-Solving Measure

The first set of analyses focused on change in the child's social problem-solving abilities before and after treatment. A multivariate analysis of variance (MANOVA) with repeated measures (time: before and after intervention) was conducted for the following PSM categories: activity, passivity, relevance, total number of alternative solutions provided, help content, social content, and nonsocial content. Results showed a significant $F(\text{Wilks' criterion}) (8, 7) = 8.24, p < .01^2$ for the time effect. High-functioning children with autism demonstrated progress between time 1 and time 2 on the problem-solving measure. A follow-up univariate analyses of variance (ANOVA) revealed that the differences between time 1 and time 2 on the PSM stemmed from significant differences in: relevance, $F(1, 14) = 16.00, p < .001$, and nonsocial solutions, $F(1, 14) = 13.23, p < .01$. After treatment, high-functioning children with autism could suggest significantly more relevant solutions ($M = 6.80, SD = 2.30$ at time 1 and $M = 8.40, SD = 1.12$ at time 2) and suggested fewer nonsocial solutions ($M = 3.73, SD = 1.90$ at time 1 and $M = 1.60, SD = 0.73$ at time 2). Also, a tendency for significance was found for the provision of a higher number of social solutions after treatment, $F(1, 14) = 5.71, p < .05$ ($M = 4.33, SD = 2.63$ at time 1 and $M = 5.60, SD = 1.35$ at time 2).

Emotional Understanding: Performance on the Emotion Inventory

The second set of analyses focused on the child's change in three main dimensions of emotional understanding: (a) knowledge of emotions, (b) inclusion of an audience, and (c) general versus specific examples.

Knowledge Dimension

Paired t test analyses were executed to examine differences over time in the children's knowledge (i.e., the number of emotions the child could exemplify) of four basic emotions (happy, sad, afraid, and angry) and of six complex emotions (pride, embarrassment, loneliness, guilt, affection, and jealousy). Children progressed over time in their knowledge of complex

emotions, $t(14) = 4.09, p < .001$ ($M = 2.46, SD = 2.03$ at time 1 and $M = 4.33, SD = 1.58$ at time 2). Children also showed a progressive tendency in their knowledge of basic emotions, $t(14) = 2.43, p = .02$ ($M = 3.06, SD = 1.48$ at time 1 and $M = 4.00, SD = 0.00$ at time 2). All children could provide an example of all four basic emotions after treatment, whereas only 60% could complete this task fully before treatment. In terms of the six complex emotions, before treatment only 27% could provide an example of a time they felt five or more of the complex emotions, whereas 53% of the sample could complete this task after treatment.

Audience Dimension

A MANOVA with repeated measures (time: before and after intervention) was computed regarding the inclusion of an audience in the total number of examples of basic emotions, complex emotions, and overall. Results showed a significant $F(\text{Wilks' criterion}) (2, 13) = 41.94, p < .000$. Follow-up ANOVAs demonstrated that high-functioning children with autism were likely to obtain higher scores on all three of the emotion types (basic emotions, complex emotions, and overall number of emotions) after treatment. Means, standard deviations, and F values are presented in Table 2.

General versus Specific Dimension

A MANOVA with repeated measures (time) was computed to test for differences in general versus specific examples for the two types of emotion (i.e., general examples of basic emotions, specific examples of basic emotions, general examples of complex emotions, and specific examples of complex emotions). Results showed a significant $F(\text{Wilks' criterion}) (4, 11) = 20.70, p < .000$. Follow-up ANOVAs revealed that high-functioning children with autism were likely to provide more specific examples of complex emotions and fewer general examples of complex emotions (see Table 2).

Social Behavior: Social Interaction

The third set of analyses focused on change in the child's observed social interactions before and after treatment. Overall, descriptive analysis of the three major observation categories, positive interaction, negative interaction, and low-level interaction, revealed that the majority of children's social initiations and responses at both time 1 and time 2 were coded as positive social interaction. Children rarely initiated or responded at low levels of interaction, and even fewer

² Due to the large number of comparisons undertaken in the current study relative to the number of participants, a more conservative p value of .01 was considered significant throughout.

Table II. Differences Between Time 1 and Time 2 on the Inclusion of an Audience and on General Versus Specific Examples for the Emotion Inventory

	Time 1 ^a	Time 2 ^a	Group differences ^b <i>F</i> (1, 14)
Audience			
Basic emotions	2.80 (1.82)	5.00 (1.64)	21.00 ^c
Complex emotions	2.07 (2.12)	6.67 (3.15)	58.77 ^c
Overall emotions	4.86 (3.24)	11.67 (4.20)	89.58 ^c
General specific			
Basic: general	0.53 (0.64)	0.46 (0.74)	0.49
Basic: specific	2.53 (1.30)	3.53 (0.74)	8.07
Complex: general	1.06 (1.16)	0.002 (0.25)	9.54 ^d
Complex: specific	1.40 (1.35)	4.27 (1.53)	54.38 ^c

^a Values given as *M* (*SD*).

^b Several *SDs* were higher than their means; therefore, an additional Wilcoxon nonparametric test was performed for these cases, and the same significant differences emerged.

^c *p* < .001.

^d *p* < .01.

behaviors were noted in the negative social interaction category. A 2 × 2 ANOVA (time 1/time 2 × type of behavior: initiating/responding) with repeated measures on time was conducted for each of the three main social interaction categories. Results for the positive social interaction revealed significant main effects for time, *F*(1, 14) = 21.55, *p* < .001, and for type of behavior, *F*(1, 14) = 26.12, *p* < .000. Children with autism were more likely to initiate and respond positively to their peers after treatment. In addition, they were more likely to initiate positive interactions than to respond positively to peers, regardless of the treatment. Results for the low-level interaction also revealed a significant main effect for type of behavior, *F*(1, 14) = 53.43, *p* < .001, despite the small total number of such behaviors observed. Children with autism were more likely to initiate low-level interactions with their peers than to respond in such a way to peers' overtures, regardless of the treatment. As mentioned above, negative social behaviors were too few to reach significance.

Means, standard deviations, and *F* values are presented in Table 3 and 4.

To explore changes in the specific observed social behaviors after treatment, repeated ANOVAs with time (time 1/time 2) by type of behavior (initiating/responding) were also conducted for the specific social behaviors described in Appendix C. For positive interactions, ANOVAs were performed for 8 of the 10 different positive social behaviors (affection and greeting behaviors were too seldom observed to be included in the analyses). Results demonstrated significant main effects for time in the following three positive social behaviors: eye contact, *F*(1, 14) = 20.60, *p* < .001; talk to express interest in another, *F*(1, 14) = 7.99, *p* < .01; and sharing experience, *F*(1, 14) = 11.55, *p* < .01. Significant main effects for type of behavior were also found for the same positive behaviors: eye contact, *F*(1, 14) = 18.87, *p* < .001; talk that expresses interest in another, *F*(1, 14) = 13.00, *p* < .01; and sharing experience, *F*(1, 14) = 11.86, *p* < .01. Altogether, children

Table III. Differences Between Time 1 and Time 2 on Major Categories of Observed Social Interaction

Interaction	Time 1 ^a	Time 2 ^a	Group differences <i>F</i> (1, 14)
Positive	6.09 (4.75)	12.0 (6.38)	21.55 ^b
Low level	3.33 (2.51)	4.46 (2.84)	2.62
Negative	0.50 (1.20)	0.86 (2.00)	0.48

^a Values given as *M* (*SD*).

^b *p* < .001.

Table IV. Differences Between Initiations and Responses on Major Categories of Social Interaction

Interaction	Initiations ^a	Responses ^a	Group differences <i>F</i> (1, 14)
Positive	12.56 (6.81)	5.56 (4.32)	26.11 ^b
Low level	6.60 (4.01)	1.20 (0.82)	53.43 ^b
Negative	1.33 (2.80)	.03 (0.40)	3.05

^a Values given as *M* (*SD*).

^b *p* < .001.

with autism demonstrated growth after treatment in their initiations and responses of several key prosocial behaviors.

For low-level interactions, only the differences between time 1 and time 2 on the initiations of repetitive ritualistic behaviors and on the initiations and responses of functional behaviors were found significant. Children with autism were less likely after treatment to initiate repetitive ritualistic autistic behaviors than they were before treatment, $F(1, 14) = 10.20, p < .01$. They also showed a growth after treatment in their initiations of and responses to functional behaviors, $F(1, 14) = 46.07, p < .001$; $F(1, 14) = 47.25, p < .001$, respectively.

Social Behavior: Teacher Reported Overall Social Skills

The fourth set of analyses focused on change in teacher reported social skills. Children's scores on the SSRS-T were compared using a repeated measure MANOVA with time (before and after intervention) as the independent variable and with the three social skills subscales (cooperation, assertion, and self-control) as the dependent variables. Results of the MANOVA revealed a significant F (Wilks' criterion) $(3, 12) = 13.04, p < .001$. Follow-up ANOVAs showed that high functioning children with autism obtained significantly higher scores after treatment on cooperation, $F(1, 14) = 11.65, p < .01$ and on assertion, $F(1, 14) = 24.34, p < .001$ (Table 5).

Last, all of the variables on which children demonstrated improvement after treatment (i.e., relevance and nonsocial solutions on the PSM; knowledge, audience, and general/specific on the emotion inventory; positive and low-level interaction in the social interaction; and cooperation and assertion on the teacher's report) were analyzed for correlations with the children's chronological age, verbal IQ, performance IQ, and full-scale IQ. None of the correlations with the child's chrono-

logical age were found to be significant. In terms of IQ, only one significant finding emerged: Teacher-reported cooperation was found to be significantly correlated with the child's verbal IQ ($r = .65, p < .01$).

DISCUSSION

The present study examined the efficacy of an intervention program designed to enhance the social competence of high-functioning children with autism. The intervention adapted a multidimensional concept of social competence that emphasizes the child's social cognitive capabilities (e.g., problem solving and emotional understanding) as well as ability to learn and practice specific social behaviors such as sharing or cooperating (e.g., Kendall & Panichelli-Mindel, 1995). In addition, the intervention followed an ecological concept in which the child's close social agents (e.g., parents, teachers, and peers) play an active role in the intervention, working together on the enhancement of the child's social competence (Bronfenbrenner, 1979, 1992).

Altogether, children demonstrated improvement in all three areas of intervention: social cognition/social problem solving, emotion understanding, and social interaction. More specifically, high-functioning children with autism demonstrated growth in their overall positive social interaction behaviors, evidencing the largest growth in two key prosocial behaviors, speech that expresses an interest in another child and sharing experiences with a peer, as well as in their eye contact skills. In addition, a reduction in children's repetitive or ritualistic behaviors and an increase in functional behaviors were also notable after treatment. In terms of their social cognitive abilities, although these children could not provide more solutions to social problems after treatment, they underwent a qualitative change in the nature of their solutions. Irrelevant, nonsocial solutions became fewer, and a tendency to produce more relevant social solutions was noticed. Moreover, children improved their emotional knowledge. A qualitative change was evident in their examples of emotions; after treatment, these children demonstrated improvement in their ability to provide more specific examples of complex emotions, with greater attention paid to the role of the audience in exemplifying emotions.

These findings, highlighting that emotions can be taught and that social understanding can be improved as an outcome of training, corroborate recent studies that focused on the facilitation of social cognitive abilities in these children (e.g., Hadwin *et al.*, 1996; Gray, 1998; Ozonoff & Miller, 1995; Swettenham, 1996). The

Table V. Differences between Time 1 and Time 2 on Teacher-Reported Social Skills

	Time 1 ^a	Time 2 ^a	Group differences $F(1, 14)$
Cooperation	1.27 (0.43)	1.47 (0.34)	11.65 ^b
Assertion	0.76 (0.39)	1.03 (0.32)	24.34 ^c
Self-control	0.91 (0.42)	1.07 (0.37)	5.00

^a Values given as M (SD).

^b $p < .01$.

^c $p < .001$.

MANOVA Wilks' criterion $F(3, 12) = 13.04$ ($p < .001$).

current improvement in social cognition also substantiates the theoretical notion of partial cognitive compensation for social-emotional deficits in this population. Several studies have demonstrated that these high-functioning children with autism are able to utilize their relatively high cognitive abilities to acquire a better understanding of the less understandable social world (e.g., Kasari, Chamberlain, & Bauminger, 2001; Capps *et al.*, 1992; Hermelin & O'Connor, 1985; Sigman & Ruskin, 1999; Yirmiya, Sigman, Kasari, & Mundy, 1992). However, a major question raised by the current study, in line with the main difficulty encountered in other similar recent intervention programs designed specifically for this population, is whether children's improvement exceeded the learned areas and was transferred into the child's more global social competence with peers.

The answer to this question is complex for several reasons. On the one hand, children did show qualitative improvement in their social cognition abilities as well as in their social interactions with peers. In the social cognitive domain, children after treatment could provide better reasoning for the outcomes of social problems that differed from the ones they had learned. In their emotional knowledge, children provided more specific, personal examples of complex emotions. Providing more specific rather than scripted or general examples of complex emotion may suggest that these children became more aware of their own complex feelings in different situations. Children were only taught the rules of simple emotions, and although they discussed the different emotions accompanying the various social vignettes comprising the problem-solving model, children were not explicitly instructed to provide more specific (rather than general) examples of emotions. Their increased ability to describe specific instances of various emotions after treatment may indicate an improvement in children's recognition and awareness of their own emotional cues after treatment. Also, children were not directly taught to include an audience in their examples, and the fact that they did so after treatment implies that perhaps they increased their sensitivity and acknowledgment of other people's roles in their emotional world. In terms of social interactions, children did show an increase in their positive interaction with peers other than the assigned peer with whom they had practiced the different social tasks. Also, teachers reported an improvement in children's overall social skills, specifically in their ability to be more assertive (e.g., to initiate more social activities with peers), and in the child's ability to cooperate on different tasks at school. Other indications of children's

improvement in general social adjustment concerned the reduction of repetitive social behaviors and the increase in functional behaviors observed in children's interactions after treatment.

On the other hand, several methodological shortcomings of the current study should be taken into consideration in appraising these children's improvement. The first limitation lies in the absence of a control group, which might receive no treatment or a different type of treatment. It is difficult to rule out the possibility that improvement stemmed from natural maturation and experience and/or from the special attention given to the children through this intervention. Yet, no significant correlations emerged between areas in which the children showed improvement and the children's chronological age. Also, evidence does support the fact that peer interaction and social-emotional understanding comprise major areas of difficulty for children with autism, regardless of age or cognitive level (*DSM-IV*; American Psychiatric Association, 1994). In addition, natural maturation (e.g., puberty) has been shown to place these children at higher risk for experiencing loneliness and depression, due to their greater awareness of their own social difficulties (Wing, 1992). Nevertheless, due to the lack of a control group, it is difficult to estimate the degree and longevity of change rendered by the suggested model of intervention.

A second limitation is rooted in the study's conceptual basis. Its ecological model holds that improvement of social skills in high functioning children with autism requires the participation of different social agents in the child's environment (peer, parents, and teachers). Likewise, the intervention adopted an integrative cognitive-behavioral definition of social competence that included enhancing children's social cognitive and emotional understanding and their social interaction behaviors. However, this very implementation of different social agents and a package of social skills tasks (social problem and affective education) render it difficult to pinpoint the factors directly responsible for the children's progress. According to the conceptual basis of the intervention (the ecological model and cognitive-behavioral therapy), it is the combination of all aspects together that caused change. Only future comparative studies that examine components within the more comprehensive intervention implemented in the current study will be able to better delineate each component's magnitude of contribution to children's improvement.

A third issue to be considered concerns the assessment measures used in the current study. Although the PSM measure used to assess problem solving was not

identical in either its content or procedure to the intervention’s problem solving model, future studies would do well to add less verbally mediated sociocognitive tasks. Also, teachers were both the intervention agent and one of its evaluators. Although their reports corroborated findings gleaned from other measures, the possibility cannot be ruled out that teachers’ ratings were influenced by their work with the child during the year. For comparison, future research should include reports from teachers others than the one who implemented the intervention. Last, the knowledge that the children were undergoing social training could have influenced the observer of peer interactions; however, the long (7-month) duration between the observation intervals reduced the likelihood that the observer could recall individual children’s pretest behaviors during the posttest observation.

On the whole, the current study seems to offer a potentially powerful model of intervention to promote the social cognition abilities and peer social interactions of high-functioning children with autism. Perhaps one father of a high-functioning child with autism can best indicate the potential impact of this intervention for such children: “I think that the most powerful contribution of this intervention is the growth in my child’s self-confidence. He is much less afraid of being actively involved with peers now.” However, due to the study’s methodological limitations, caution should be taken in interpreting the results as demonstrating improvement that exceeded the areas learned in the current intervention, and future comparative studies may want to examine the relative contribution of each of the intervention components.

APPENDIX A: CONTENT ANALYSIS FOR PROBLEM-SOLVING MEASURE

Category	Definition	Examples
Help		
Help seeking	The child asks for help in solving the problem.	“Dan asked Gal to help him get his ball down from the tree.”
Help giving	The child offers help	“Dan asked Gal if he needs help.”
Social		
Direct social verbal	Any verbal utterance intended to solve the problem socially	Dan said to Gal: “Let’s play.”
Direct social action	Any action intended to solve the problem socially	“Dan played with Gal.”
Nonsocial		
Nonconfrontation	The child deals with other issues (such as his or her feelings toward the problem) and ignores the problem.	“Dan sat and cried.”
Direct nonsocial action	Any action performed without the purpose of making a social overture	“Dan took the cat to the doctor.”

APPENDIX B: AN ILLUSTRATION OF THE SOCIAL-INTERPERSONAL PROBLEM-SOLVING CURRICULUM

Social Initiation: Initiating a Social Conversation with a Friend

Introduction: Concept Clarification

Clarification of the concept *social conversation* was performed through a dialogue. Contents included: what social conversation is, how do we listen, how do we base our talk on what we hear from

the other person’s talk, examples of types of conversations, etc.

Social Problem Vignettes

Each of three social vignettes on initiating a social conversation with a friend was taught separately by the class teacher.

Vignette 1: Yoram went out at recess time and saw his friend Yaniv sitting alone. Yoram would like to start a conversation with Yaniv, but he doesn’t know how.

Vignette 2: Yoram is sitting on the bus next to Yaniv. Yoram would like to start a conversation with Yaniv, but he doesn't know how.

Vignette 3: In the afternoon, Yoram usually goes to the playground near his house. Often he sees Yaniv there and wants to talk with him, but he doesn't know how.

After its presentation, each of the vignettes was discussed with the child in terms of the following stages:

- (1) Defining the problem ("What is the problem in this story?"). This stage helps the child define and clarify the social target s/he needs to confront.
- (2) Discussing the emotion(s) that can be elicited by the story.
- (3) Defining the social alternatives that can be implemented in this situation (i.e., expanding the child's repertoire of social alternatives for this social initiation).
- (4) Considering the consequences of each of the social alternatives (i.e., understanding continuity and causality in social behavior).
- (5) Making a decision regarding the social alternative that offers the best solution to the problem.
- (6) Enacting the solution with the teacher in role—play (i.e., practicing the learned social behavior in a safe environment).
- (7) Receiving homework to practice social behaviors that are related to the learned social initiation, with peers at home (see the Homework section).
- (8) Receiving feedback from the teacher on homework performance with the peer, using the following questions as guidelines: Did you carry out the social activity with your peer? How did you feel? What was hard? What was easy? What did you learn from it for the next conversation?

Homework

The social activity planned for initiating social conversation consisted of guiding the child with autism to make a telephone call to his or her assigned peer and to talk with the peer in social conversation on the telephone.

Parents' Cooperation

Parents had to support their child with autism in making the telephone calls to his or her assigned peer and to help their child find topics for conversation with the peer.

APPENDIX C: DEFINITIONS OF OBSERVED SOCIAL BEHAVIORS

1. **Social initiation:** The child begins a new social sequence, distinguished from a continuation of a previous sequence by a change in activity.
2. **Social response:** The child responds verbally and/or nonverbally to social stimuli directed toward him/her by peers.
3. **Positive social interaction:** The child exhibits verbal and nonverbal social behaviors that lead to an effective social process with peers. Behaviors that serve to start or maintain social interaction.
 - Eye contact—The child looks into the eyes of another child.
 - Eye contact combined with smile—The child looks at and smiles toward another child.
 - Smile with no eye contact—The child smiles at another child but does not look into the peer's eyes.
 - Affection—The child expresses affection toward another child, either verbally (e.g., "You're nice," "I like you") or nonverbally (e.g., hugs, touches).
 - Sharing objects—The child offers his/her objects to another child or shares an object with another child.
 - Sharing experience—The child tells about an experience to peers or asks them about their experiences (e.g., "What did you do over the weekend?").
 - Social communication—The child approaches another child with a social (rather than functional) intention (e.g., "Let's play").
 - Talk that reflects an interest in another child—The child expresses an interest in another child's hobbies (e.g., "What's your favorite game/object?"), mood (e.g., "Are you sad?"), etc.
 - Greeting—The child says hello to another child or replies appropriately to such a greeting.
 - Giving help—The child offers help to another child.
4. **Negative social interaction:** The child exhibits unpleasant social behaviors that operate to stop or decrease the likelihood of the development of an adequate social interaction.
 - Physical or verbal aggressiveness—The child behaves in malicious intrusive ways toward peers (e.g., yells, screams, makes fun of, hits, pushes, pinches, slaps).

- Temper tantrum—The child expresses anger in an extreme way (e.g., screams and shouts, hits other children, hits objects/walls, etc).
 - Teasing—The child tries to drag another child into a fight or conflict.
 - Controlling—The child dominates other children without respecting their needs.
 - Avoidance—The child avoids social overtures made toward him/her by peers.
 - Looking away—The child actively avoids social contact by looking away from the initiator.
5. **Low-level interaction:** The child exhibits behaviors that indicate social intention, but with minimal social enactment, such as close proximity to children without initiating a positive social interaction. Also includes behaviors typical of the autistic syndrome (e.g., echolalia, idiosyncratic language).
- Looking—The child looks at the other child's face or body, or child's action, without establishing eye contact.
 - Close proximity—The child stands in close proximity to another child (3 feet or less) but does not approach the peer.
 - "Yes" and "no"—The child only nods his/her head for yes or shakes it for no.
 - Imitation—The child imitates another child's talk or activity.
 - Idiosyncratic language—The child uses utterances with no clear meaning.
 - Repetitive behavior—The child behaves in a repetitive manner with no clear communication intent, but with close proximity to another child.
 - Functional communication—The child approaches or responds to another child with an intention to fulfill his/her own needs, and with no social intention (e.g., "It's my turn on the computer now").

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REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed., rev.). Washington, DC: American Psychiatric Association.
- Attwood, T. (1998). *Asperger syndrome: A guide for parents and professionals*. London: Jessica Kingsley.
- Bacon, A. L., Fein, D., Morris, R., Waterhouse, L., & Allen, D. (1998). The responses of autistic children to the distress of others. *Journal of Autism and Developmental Disorders*, 28, 129–142.
- Baron-Cohen, S., & Swettenham, J. (1997). Theory of mind in autism: Its relations to executive function and central coherence. In D. J. & F. R. Volkmar (Eds.), *Handbook of autism and developmental disorders* (pp. 880–893). New York: Wiley.
- Bauminger, N., & Kasari, C. (1999). Theory of mind in high-functioning children with autism. *Journal of Autism and Developmental Disorders*, 29, 81–86.
- Bauminger, N., & Kasari, C. (2000). Loneliness and friendship in high-functioning children with autism. *Child Development*, 71, 447–456.
- Bauminger, N., & Shulman, C. (2001). *Friendship in high-functioning children with autism: Child's and parents' perspectives*. Paper presented at the Promised Childhood Congress, April, Israel.
- Bormann-Kischkel, C., Vilsmeier, M., & Baude, B. (1995). The development of emotional concept in autism. *Journal of Psychology and Psychiatry and Allied Disciplines*, 36, 1243–1259.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiment in nature and design*. Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U. (1992). Ecological systems theory. In R. Vasta (Ed.), *Annals of child development. Six theories of child development: Revised formulations and current issues* (pp. 178–249). London: Jessica Kingsley.
- Buitelaar, J. K., Van der Wees, M., Swaab-Barneveld, H., & Van der Gaag, R. J. (1999). Verbal memory and performance IQ predict theory of mind and emotion recognition ability in children with autism spectrum disorders and in psychiatric control children. *Journal of Child Psychology and Psychiatry*, 40, 869–881.
- Capps, L., Sigman, M., & Yirmiya, N. (1995). Self-competence and emotional understanding in high-functioning children with autism. *Development and Psychopathology*, 7, 137–149.
- Capps, L., Yirmiya, N., & Sigman, M. (1992). Understanding of simple and complex emotions in non-retarded children with autism. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 33, 1169–1182.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social-information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, 115, 74–101.
- Dahlgren, S. O., & Trillingsgaard, A. (1996). Theory of mind in non-retarded children with autism and Asperger's syndrome: a research note. *Journal of Child Psychology and Psychiatry*, 37, 759–763.
- Frith, U. (1989). *Autism: Explaining the enigma*. Oxford, England: Basil Blackwell.
- Gray, C. A. (1998). Social stories and comic strip conversations with students with Asperger syndrome and high-functioning autism. In E. Schopler, G. Mesibov., & Kuncie, L. (Eds.), *Asperger syndrome or high-functioning autism* (pp. 167–199). New York: Plenum Press.
- Gresham, F. M., & Elliott, S. N. (1990). *Social skills rating system (SSRR)*. Circle Pines, MN: American Guidance Service.

- Hadwin, J., Baron-Cohen, S., Howlin, P., & Hill, K. (1996). Can we teach children with autism to understand emotions, belief, or pretense? *Development and Psychopathology*, 8, 345–365.
- Hadwin, J., Baron-Cohen, S., Howlin, P., & Hill, K. (1997). Does teaching theory of mind have an effect on the ability to develop conversation in children with autism. *Journal of Autism and Developmental Disorders*, 27, 519–535.
- Happe, F. G. E. (1994). An advanced test of theory of mind: understanding of story characters' thoughts and feelings by able autistic, mentally handicapped, and normal children and adults. *Journal of Autism and Developmental Disorders*, 24, 129–154.
- Hart, K. J., & Morgan, J. R. (1993). Cognitive behavioral therapy with children: historical context and current status. In A. J. Finch, W. M. Nelson, & E. S. Ott (Eds.), *Cognitive behavior procedures with children and adolescents: A practical guide*. Boston: Allyn Bacon.
- Hauck, M., Fein, D., Waterhouse, L., & Feinstein, C. (1995). Social initiations by autistic children to adults and other children. *Journal of Autism and Developmental Disorders*, 25, 579–595.
- Hermelin, B., & O'Connor, N. (1985). Logico-affective states and nonverbal language. In E. Schopler, & G. B. Mesibov (Eds.), *Communication problems in autism* (pp. 283–309). New York: Plenum Press.
- Hobson, R. P. (1993). The emotional origins of social understanding. *Philosophical Psychology*, 6, 227–245.
- Howlin, P. (1998). Practitioner review: Psychological and educational treatments for autism. *Journal of Child Psychology and Psychiatry*, 39, 307–322.
- Jaedicke, S., Storoschuk, S., & Lord, C. (1994). Subjective experience and causes of affect in high-functioning children and adolescents with autism. *Development and Psychopathology*, 6, 273–284.
- Kasari, C., Chamberlain, B., Paparella, T., & Bauminger, N. (1999). Self evaluative social emotions in children with autism. Poster presented at the Society of Research for Child and Adolescent Psychiatry, Barcelona, Spain.
- Kasari, C., Chamberlain, B., & Bauminger, N. (2001). Social emotions and social relationships in autism: can children with autism compensate? In J. Burack, T. Charman, N. Yirmiya, & P. Zelazo (Eds.), *Development and autism: Perspectives from theory and research*. Hillsdale, NJ: Erlbaum Press.
- Kendall, P. C., & Braswell, L. (1993). *Cognitive-behavioral therapy for impulsive children* (2nd ed.). New York: Guilford.
- Kendall, P. C., & Panichelli-Mindel, S. (1995). Cognitive-behavioral treatments. *Journal of Abnormal Child Psychology*, 23, 107–124.
- Klin, A. (2000). Attributing social meaning to ambiguous visual stimuli in higher-functioning autism and Asperger syndrome: the social attribution task. *Journal of Child Psychology and Psychiatry*, 41, 831–846.
- Kunze, L. J., & Mesibov, G. B. (1998). Educational approaches to high-functioning autism and Asperger syndrome. In E. Schopler, G. B. Mesibov, & L. J. Kunze (Eds.), *Asperger syndrome or high-functioning autism* (pp. 227–261). New York: Plenum Press.
- Lochman, J. E., & Lampron, L. B. (1986). Situational social problem solving skills and self-esteem of aggressive and nonaggressive boys. *Journal of Abnormal Psychology*, 14, 605–661.
- Lord, C., & Magill-Evans, J. (1995). Peer interactions of autistic children and adolescents. *Development and Psychopathology*, 7, 611–626.
- Lord, C., Rutter, M., & LeCouteur, A. (1994). Autism diagnostic interview-revised: a revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders*, 19, 185–212.
- Loveland, K. A., Tunali-Kotoski, B., Chen, Y. R., Ortegon, J. P. D., Brelsford, K. A., & Gibbs, M. C. (1997). Emotion recognition in autism: verbal and nonverbal information. *Development and Psychopathology*, 9, 579–593.
- Margalit, M., & Weisel, A. (1990). Computer-assisted social skills learning for adolescents with mild disabilities and social difficulties. *Educational Psychology*, 10, 343–354.
- Ozonoff, S., & Miller, J. N. (1995). Teaching theory of mind: a new approach to social skills training for individuals with autism. *Journal of Autism and Developmental Disorders*, 25, 415–433.
- Perner, J., & Wimmer, H. (1985). "John thinks that Mary thinks that . . ." attribution of second-order beliefs by 5- to 10-year-old children. *Journal of Experimental Child Psychology*, 39, 437–471.
- Rogers, S. J. (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders*, 30, 399–409.
- Rutter, M. (1996). Autism research: prospects and priorities. *Journal of Autism and Developmental Disorders*, 26, 257–275.
- Seidner, L. B., Stipek, D. J., & Feshbach, N. D. (1988). A developmental analysis of elementary school-aged children's concepts of pride and embarrassment. *Child Development*, 59, 367–377.
- Shores, R. L. (1987). Overview of research on social interaction: a historical and personal perspective. *Behavioral Disorders*, 12, 233–241.
- Shure, M. B. (1981). Social competence as a problem-solving skill. In J. D. Wine, & M. D. Smye (Eds.), *Social competence* (pp. 158–185). New York: Guilford Press.
- Siegel, D. J., Goldstein, G., & Minshew, N. J. (1996). Designing instruction for the high-functioning autistic individuals. *Journal of Development and Psychology*, 1, 1–19.
- Sigman, M., & Ruskin, E. (1999). Continuity and change in the social competence of children with autism, Downs syndrome, and developmental delays. *Monographs of the Society for Research in Child Development*, 64 (1, Serial No. 256).
- Simpson, R. L., Myles, B. S., Sasso, G. M., & Kamps, D. M. (1997). *Social skills for students with autism*. CEC mini library: Working with behavioral disorders, Reston, VA.
- Spivack, G., & Shure, M. B. (1974). *Social adjustment of young children. A cognitive approach to solving real-life problems*. San Francisco: Jossey-Bass.
- Stone, W. L., & Caro-Martinez, L. M. (1990). Naturalistic observations of spontaneous communication in autistic children. *Journal of Autism and Developmental Disorders*, 20, 437–453.
- Swettenham, J. S. (1996). Can children with autism be taught to understand false belief using computers. *Journal of Child Psychology and Psychiatry*, 37, 157–166.
- Volkmar, F. R., Carter, A., Grossman, J., & Klin, A. (1997). Social development in autism. In D. J. Cohen, & F. R. Volkmar (Eds.), *Handbook of autism and developmental disorders* (pp. 173–194). New York: Wiley.
- Wechsler, D. (1974). *WISC-R manual: Wechsler Intelligence Scale for Children-Revised*. San Antonio, TX: Psychological Corporation.
- Wing, L. (1992). Manifestation of social problems in high-functioning autistic people. In E. Schopler, & G. Mesibov (Eds.), *High-functioning individuals with autism* (pp. 129–142). New York: Plenum Press.
- World Health Organization. (1990). *International classification of diseases (10th ed.), Diagnostic criteria for research (draft)*. Geneva: Author.
- Yirmiya, N., Sigman, M., Kasari, C., & Mundy, P. (1992). Empathy and cognition in high functioning children with autism. *Child Development*, 63, 150–165.

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