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EFFECTIVENESS OF THE SOCIAL BEHAVIOR MAPPING INTERVENTION ON THE SOCIAL COMMUNICATION SKILLS OF ADOLESCENTS WITH AUTISM SPECTRUM DISORDER

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BY

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DISSERTATION

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DEDICATION

"I can do all things through Christ who strengthens me."
Philippians 4:13 (JUB)

I dedicate this dissertation to my brother, Jeremy, who is the reason I became a speech-language pathologist. He was my inspiration for entering the field of ASD and continues to motivate me to make a difference. I dedicate this dissertation to my parents, who have always believed in me even when I didn't believe in myself. To my mom who always took the time to listen and pray with me, no matter what time it was or what she was doing. She taught me to seek God's will for my life and to see the bright side of things, no matter the circumstances. To my dad who taught me that no matter how many times you fall down, you get back up again; that you never give up. He has been one of my biggest cheerleaders and has always done whatever he could to help me succeed. To my other mother, Priscilla, who has supported me along this journey and helped watch my children during the many hours I worked towards my PhD. I am forever grateful for her and am blessed to have her in my life. I dedicate this dissertation to my beautiful children, Caleb and Grace, who I love beyond words. I pray that as they grow up, they go after the dreams God puts in their hearts and they never look back. I dedicate this dissertation to my husband, Jonathon, for hanging in there with me on this long journey and for being such an amazing father to our beautiful children. He supported me in more ways than I can count and I wouldn't be at the finish line if it wasn't for him. Above all, I dedicate this dissertation to Christ who died for me!

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ABSTRACT

The purpose of this study was to evaluate the effectiveness of Social Thinking® Social Behavior Mapping (SBM) on adolescents with autism spectrum disorder. A pretest-posttest control group design with matched sampling was used. There were 22 participants between the ages of 13 and 17 who were matched by age and IQ and then were randomly assigned to either an intervention group or to a treatment-as-usual group. Results revealed that participants made significant improvements on the SBM rating scale scores and participant-reported scores on the Social Skills subscale of the *Social Skills Improvement System* (SSIS; Elliott & Gresham, 2008) Rating Scales. There were no significant findings on the parent-reported scores on the SSIS Social Skills subscale or on the direct observation measures.

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Chapter 1

Introduction

Chapter 1 provides an overview of the problem, including the prevalence of Autism Spectrum Disorder (ASD), defining ASD, the controversy surrounding the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013) definition of ASD, the impact of an ASD diagnosis, and a brief history of social skills interventions. This chapter discusses the gaps in the literature. The chapter includes the purposes of this study and specific research questions. Finally, the chapter discusses the significance of the study.

Background of the Problem

Prevalence of Autism Spectrum Disorder

It is estimated that approximately 1 in 44 children has an ASD diagnosis in the United States, according to estimates from the Centers for Disease Control and Prevention (CDC; Maenner et al., 2021). ASD is approximately four times more common in boys than in girls and occurs in individuals of all races, ethnicities, and socioeconomic classes (Maenner et al., 2020). The prevalence of ASD continues to dramatically increase, with a 150% increase since 2000 (Maenner et al., 2020). In 2002, it was estimated that 1 in 150 children had ASD; in 2004, it was estimated that 1 in 125 children had ASD; in 2006, it was estimated that 1 in 110 children had ASD; in 2008, it was estimated that 1 in 88 children had ASD; and in 2010, it was estimated that 1 in 68 children had ASD (CDC, 2020).

Defining Autism Spectrum Disorder

In his first description of schizophrenia, Eugen Bleuler used the term “autistic behavior” as one of the four primary features of schizophrenia (Ashok et al., 2012). These

autistic behaviors referred to an individual socially withdrawing from others. The term "autism" was used because it comes from the Greek root word "autos," which means "self." It wasn't until the 1940s when autism as we understand it today was beginning to be distinguished from schizophrenia. However, it would be four decades before "autism" would have its own official diagnosis in the Diagnostic and Statistical Manual of Mental Disorders-Third Edition (DSM-III; American Psychiatric Association, 1980). Kanner (1943), in his first description of autism, put it best when he stated, "The children's *relation to people* is altogether different" (p. 246). Prior to this, autism was used to describe the withdrawn state of a child in Leo Kanner's descriptions of his 11 clients (Kanner, 1943).

ASD is characterized by difficulties in two primary areas: social communication and social interaction (Criterion A); and restricted, repetitive patterns of behavior, interest, or activities (Criterion B; American Psychiatric Association [APA], 2013). The first area includes difficulty with social-emotional reciprocity (e.g., the back-and-forth nature of a conversation, sharing in the interests of others); nonverbal communicative behaviors (e.g., use of gestures, eye contact, and body language); and developing, maintaining, and understanding relationships (APA, 2013). The second area refers to the presence of the following (at least two must be present to meet the diagnostic criteria of ASD): "stereotyped or repetitive motor movements, use of objects, or speech" (e.g., hand flapping, excessive lining up of objects, echolalia); "insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior" (e.g., difficultly with change, problems transitioning from one activity to the next, rigid thinking patterns); "highly restricted, fixated interests that are abnormal in intensity or focus"; and "hyper- or hyporeactive to sensory

input or unusual interests in sensory aspects of the environments" (e.g., sensitive to light/touch/sound, excessive smelling; APA, 2013, p. 50).

In addition to these two criteria, two additional criteria need to be met to obtain an ASD diagnosis, Criteria C and D. Criteria C states that symptoms must be present during the early developmental period. However, the DSM-5 goes on to clarify that the symptoms may not become fully evident until the social demands exceed one's abilities. For instance, in individuals who are higher functioning, their social difficulties often do not become readily apparent until the social demands increase in middle school and/or high school. The DSM-5 also makes note of the fact that many adults may have learned compensatory strategies that mask many of the symptoms, which is important to take into account when determining if they meet the diagnostic criteria. The fourth criterion, Criterion D, necessitates that the symptoms significantly impact one's current level of functioning in their social, occupational, or other important areas of life.

Prior to 2013, before the DSM-5 (APA, 2013) was released, ASD was a term that was commonly used but was not an official diagnosis. It was an umbrella term used to refer any number of diagnoses and terms: autistic disorder, Kanner's or classic autism, childhood disintegrative disorder, Asperger's disorder, high-functioning autism, pervasive developmental disorder not otherwise specified (PDD-NOS), atypical autism, and sometimes Rett's disorder. There was controversy about which diagnoses ASD included, and this often led to confusion when conducting and interpreting research. With DSM-5, ASD is now an official diagnosis, and the previously cited diagnoses no longer exist, with the exception of Rett's syndrome, which is a separate diagnosis. There is also a new diagnosis, social (pragmatic) communication disorder, which is separate from ASD. A social (pragmatic)

communication disorder refers to difficulty with pragmatics, or the social use of language, but there are no restrictive, repetitive behavior patterns/interests/activities (APA, 2013). In other words, if an individual has difficulty only with Criterion A but not Criterion B of the ASD diagnostic criteria, they would be diagnosed with social (pragmatic) communication disorder.

Controversy Surrounding the DSM-5 Definition of ASD

There is controversy with the DSM-5 definition of ASD. Many individuals within the ASD community fear that with the narrowing of the definition of ASD, individuals who previously met the criteria for an ASD diagnosis would no longer meet it. There is some evidence to substantiate this fear: Maenner et al. (2014) found that the estimates of ASD prevalence would likely be lower under the DSM-5 diagnostic criteria when compared with the DSM-IV-TR (APA, 2000). However, individuals already diagnosed, even if their diagnosis no longer exists, such as PDD-NOS, would be given an ASD diagnosis. The DSM-5 clearly specifies that an individual who met the criteria for a previous but no longer existing diagnosis (e.g., PDD-NOS, Asperger's, autism) should be diagnosed with ASD. However, the concern is more for those who have not yet been diagnosed. For instance, some individuals who would have been diagnosed with PPD-NOS or Asperger's disorder under the DSM-IV-TR would not meet the more exacting criteria for ASD under DSM-5. They would likely be diagnosed with a social (pragmatics) communication disorder.

However, because social (pragmatics) communication disorder is not associated with ASD, fewer services might be available for some individuals. They would not be protected under the legislation that 49 states currently have that guarantees insurance coverage for those with ASD (Autism Speaks, 2019). Historically, insurance companies have denied many

therapy services for individuals with ASD, which is why many national advocacy organizations have fought for better insurance coverages. In New Mexico, it was not until 2009 that the Autism Insurance Reform Law was enacted to require that private insurance and nonprofit health care plans cover the diagnosis and treatment of ASD (Autism Speaks, 2009). In 2013, that law was expanded to include public employees (Autism Speaks, 2013). In 2019, new legislation was passed in New Mexico (House Bill 322) that expanded applied behavioral analysis and other therapy services to adults with ASD. Previously, insurance companies in New Mexico often denied services to individuals with ASD over the age of 19.

Many researchers and clinicians favor the DSM-5 criteria for diagnosing ASD because it is less ambiguous about what is and is not considered ASD. There is just one diagnosis, ASD, that limits confusion. In addition to more clearly defining ASD, other pertinent information accompanies the diagnosis. For instance, now when diagnosing ASD, the severity of the two primary criteria (Criterion A, i.e., social communication and social interaction; and Criterion B, i.e., restricted, repetitive patterns of behavior, interests, or activities) are specified. It is defined in three levels: Level 1, “requiring support”; Level 2, “requiring substantial support”; and Level 3, “requiring very substantial support” (APA, 2013). The diagnosis further specifies with or without intellectual impairment; with or without language impairment; associated medical or genetic conditions, or environment factors; associated neurodevelopmental, mental, or behavioral disorder and if catatonia is present (APA, 2013). Such detailed information helps not only clinically when providing services to individuals but also when conducting and interpreting future research. As seen in the literature review to follow, many of the researchers reported a wide range of information about the participants and more often than not left out vital information, such as IQ scores

and language status. That lack of sufficient information about the participants made it difficult to interpret results and to determine external validity.

The DSM-5 definition of ASD presents valid concerns for individuals who are higher functioning and may no longer qualify for an ASD diagnosis. Without this diagnosis, they likely would have a harder time meeting insurance requirements to cover necessary therapy services. However, the DSM-5 definition provides more useful information for clinicians and researchers than the previous definitions.

Impact of an ASD Diagnosis

The social communication and social interaction deficits that accompany an ASD diagnosis adversely affect many areas of an individuals' life. Individuals with ASD have a hard time developing and maintaining social relationships (Lopata et al., 2006). This often results in them having few friends and being teased by peers (Ozonoff & Miller, 1995). Such individuals sometimes feel isolated and misunderstood (Broderick et al., 2002) and often feel depressed and lonely (Bauminger, 2002). Such isolation can negatively affect their self-esteem, family relationships, interactions with peers, academic performance, and overall mental health (Davis et al., 2010). Individuals with ASD want to develop friendships and to socialize with peers (Bauminger, 2002), and it is not surprising that there is a high rate of psychiatric comorbidity with an ASD diagnosis (Freitag et al., 2013). Seventy percent of individuals with an ASD diagnosis have a comorbid mental disorder (e.g., anxiety, depression), and 40% may have two or more comorbid mental disorders (APA, 2013).

Individuals with ASD are less likely to live on their own, to marry, attend college, or work independently (Howlin, 2000; Szatmari et al., 1989 as cited in Mackay et al., 2007).

They are considerably more likely to be terminated from their employment because of their difficulties with social interaction than with nonsocial factors (Jackson et al., 1998).

History of Social Skills Interventions

Researchers have been evaluating social skills interventions (SSIs) for individuals with ASD for approximately four decades, with some of the first studies occurring in 1984. Yet within the past two decades, there has been a dramatic increase in research on SSIs for individuals with ASD, with the upward trend starting in early 2000s to 2003. This is likely due to the steady increase in the development and implementation of SSI programs (Reichow & Volkmar, 2010).

Historically, SSIs have been grounded in the principles of applied behavioral analysis. The focus was on changing the external behavior through shaping, repetition, and reinforcement (Winner, 2008). Clinicians assess an individual to determine which social skills are weak or lacking and then utilize behavior-based techniques to teach the individual the desired skill (Winner, 2008). The SSIs are often successful in teaching specific skills (i.e., making eye contact, waiting in line), but the problem comes with generalization. There is not one skill that will work for every situation. For instance, how one makes eye contact with others or introduces themselves will change depending on the context and who is present. Many skills need to be taught with this approach because not one skill will work for every situation. Behaviorally based SSIs have been successful in teaching specific skills for specific contexts (i.e., making eye contact with adults) and are relatively effective for individuals who are lower functioning or have a coexisting intellectual disability (Winner, 2008).

For individuals with ASD who are higher functioning and/or who do not have an intellectual disability, cognitive-based SSIs are often more effective. As seen in the literature review to follow, there are fewer studies examining cognitive based approaches. However, more studies of late have evaluated the effectiveness of SSIs, and they show promise. The benefit of cognitive-based approaches is they address the issue of generalization by targeting the underlying social skills deficit (e.g., theory of mind). Often, it will take longer to see results with cognitive approaches (Winner, 2007) because the core deficits are being addressed, but once an improvement is made, the results are far reaching.

Gaps in the Literature

There are several gaps in the literature. First, limited research pertains to social skill instruction in adolescents with ASD. More research needs to be done in the adolescent population of individuals with ASD. Second, most existing research reported improvement in the targeted skills, but the majority of this improvement occurred in structured settings and decontextualized situations (e.g., role plays). More research is needed that examines the effects of teaching the targeted skill in a natural setting. Third, few studies assessed for the generalization of the learned skills to natural settings. That raises the question of the effectiveness of the interventions in natural settings (e.g., home or classroom). Even if the skills are generalized to natural settings, this is unknown because few studies assessed this. More interventions are needed to purposefully plan for generalization because many individuals with ASD do not automatically generalize learned skills. It is important for educators, therapists, and researchers to provide effective social skills interventions that will help students with ASD generalize skills learned in a structured setting to real-life situations and maintain those skills over time. Finally, research needs to focus on the essential

components of the social-communication interventions that generate positive outcomes. For instance, how long should the intervention be? What is the optimal number of individuals in a group? More studies need to compare different interventions to examine which are more effective and to determine under which circumstances they are most effective. There are many gaps in social-communication interventions for adolescents with ASD.

Purpose of the Study

The purposes of the study were to evaluate the efficacy of the Social Behavior Mapping (SBM) intervention in increasing the participants' ability to identify components of the social emotional chain reaction when given a social context, to examine whether participants' overall social skills improve, and to evaluate whether there is any observable change in the increase of participants' expected social behaviors and the decrease of participants' unexpected social behavior as a result of the SBM. The social emotional chain reaction involves identifying the expected and unexpected behaviors, associated emotions of others, anticipated consequences, and ultimately one's own emotional response. A social context consists of a specified social situation and the people who comprise that situation (e.g., situation: playing a board game, people involved: peers).

Adolescents were chosen for this study because individuals with ASD have difficulties with social communication skills that do not remediate over time but persist through one's life (MacKay et al., 2007). Often, as individuals with ASD reach adolescence, their behavioral oddities and social awkwardness become more apparent and are less tolerated by peers (White et al., 2013). That further necessitates the need for effective interventions for adolescents with ASD. Additionally, limited research is available for the adolescent population (Webb et al., 2004). Social skills interventions were chosen because

many curriculums are available for running social groups but only a limited number have been evaluated in the literature (Rose & Anketell, 2009). Moreover, the Committee on Educational Interventions for Children with Autism prioritized six types of interventions for individuals with ASD, and social instruction was one of them (National Research Council, 2001).

Research Questions

- Does SBM intervention increase a participant's observed ability to identify the components of the social emotional chain reaction (i.e., identifying the expected and unexpected behaviors of a given social context, the associated emotions of others, anticipated consequences, and the participant's own emotional response) from the completed social behavior maps (preintervention and postintervention) by the participants?
- Does SBM intervention result in an improvement of social skills as reported by participants and parents on the Social Skills subscale of the *Social Skills Improvement System* (SSIS)?
- Does the SBM intervention increase the number of a participant's expected behaviors and decrease the number of a participant's unexpected behaviors, as measured by observation?

Significance of the Study

Social Thinking® is a cognitive approach in which the focus is not on changing specific behaviors but rather is on changing the underlying thinking processes and on increasing social thinking (Winner, 2007). The emphasis is on helping an individual with ASD to think about what others are thinking about, and to increase an individual's self-

awareness and social perception, which will ultimately result in behavior changes. Social Thinking® is a language-based approach and thus necessitates that the individual have a verbal IQ of 70 and above.

A part of the Social Thinking® approach involves using key vocabulary (e.g., expected behavior, unexpected behavior, weird thoughts, etc.) in which abstract concepts are labeled and explained concretely (Winner, 2007). Another component of Social Thinking® is SBM (Winner, 2007). SBM is the focus of this study and is described in detail in Chapter 3. Little research has been conducted to examine the extent to which the Social Thinking® approach can be used to improve social communication skills of adolescents with ASD. This study contributes to the social skills intervention literature in the field of ASD.

Summary and Organization of the Dissertation

Chapter 1 provides the context of the problem, the gaps in the literature, purposes of the study, the research questions, and ultimately the significance of the study. Chapter 2 provides a review of research literature of social skills interventions in adolescence with ASD. The major findings are discussed. The chapter also takes a closer look at different research designs used in social skills interventions. The chapter concludes with a discussion of the overall findings of the literature review. Chapter 3 describes the research methods used in this study, provides an overview of the intervention, and describes the measures used in the study. Chapter 4 reviews the research questions and provides a detailed analysis of the results. It reports treatment fidelity and interobserver agreement. Chapter 5 discusses the major findings, limitations of the study; implications for practice, and future research is discussed. Overall conclusions and recommendations also are presented.

Chapter 2

Literature Review

Chapter 2 presents a systemic literature review that examined the social communications skills interventions in adolescents with ASD. The impact of deficits in social communication skills in individuals with ASD is briefly discussed to highlight the importance of social communication skills interventions and why it was chosen for this review. Clarification about the diagnoses that compromise ASD for the purposes of this review is included along with defining social communication. A brief discussion on why adolescents were chosen is also presented. A detailed description of the methods used for the literature review is provided. The articles reviewed are summarized in detail and organized by the type of intervention used in the study. The chapter concludes with a discussion of the findings of the literature review, including discussion on the participant characteristics, the type of settings where the intervention occurred, outcome measure used, and research designs used in the reviewed literature.

A core feature of ASD is deficits in social interaction. ASD makes it more difficult to live an independent and productive life; Prizant and Wetherby (2005) stated that social-communication skills are essential for such a life to occur. Additionally, ASD often results in an individual having few friends and being teased by peers (Ozonoff & Miller, 1995). These individuals are considerably more likely to be terminated from employment because of their difficulties with social interaction than with nonsocial factors (Jackson et al., 2004).

According to the U.S. National Institutes of Health (2011), ASD is synonymous with pervasive developmental disorders and includes the following diagnoses: autistic disorder, Asperger's disorder, PDD-NOS, Rett's disorder, and childhood disintegrative disorder

(2011). The Committee on Educational Interventions for Children with Autism included in its definition of ASD all of the previously noted diagnoses, except for Rett's syndrome. Rett's syndrome was not included because it has characteristics that differ from the other diagnoses (National Research Council, 2001). In Rett's syndrome, the child will lose social engagement early on but will later develop social interaction skills (APA, 2000); this is not a characteristic of the other ASD diagnoses. For the purposes of this review, ASD included the following diagnoses: autism/autistic disorder, PDD-NOS, Asperger's disorder/syndrome, high-functioning autism (HFA), and childhood disintegrative disorder. I included the diagnoses that were more aligned with the previous DSM-IV in the literature review because I was including research that was published prior to the DSM-5.

According to Prizant and Wetherby (2005), the term social communication refers to the use of conventional and socially appropriate verbal and nonverbal means to communicate for a variety of purposes across social contexts and partners. Social communication also involves some degree of understanding of social events, in order to use social communicative skills appropriately.

In other words, social communication is communication, both verbal and nonverbal, in social contexts with other people. For social communication to successfully occur, an individual must have insight into the thoughts, intentions, motives, and behaviors of one's self and others (aka, social cognition; Flavell et al., 1993). Additionally, the individual requires the skills necessary to generate a positive response from the social interaction (aka, social skills; Gresham & Elliot, 1998). For the purposes of this literature review, social communication interventions include interventions that target social-communication, social

cognition, and social skills, all of which are necessary for a successful social interaction to occur.

This persistence of social deficits throughout one's life is one reason the adolescent population was chosen for this review. An adolescent is defined as any individual between the ages of 13 and 17. Additionally, there was limited research available for the adolescent population (Webb et al., 2004). Social-communication interventions were chosen because many curriculums are available for running social groups, but only a limited number have been evaluated in the literature (Rose & Anketell, 2009). Moreover, the Committee on Educational Interventions for Children with Autism prioritized six types of interventions for individuals with ASD, and social instruction was one of them (National Research Council, 2001). The purpose of this review of research was to answer the following question: What research has been done that evaluated the effectiveness of social-communication skills interventions for adolescents with ASD?

Systematic Review of Research

Methods

I systematically searched for research published in peer-reviewed journals in the PsychINFO 1887-Current, PsycARTICLES, and Academic Search Complete electronic databases. In every search, the word *adolescent* was used to narrow the search by the desired age range and *autism spectrum disorders*, *autism*, *Asperg**, and *Pervasive Developmental Disability* were used to narrow the search by the disability category. The phrases *social skills*, *social*, *socialization*, *pragmatics*, and *social communication* were searched in conjunction with intervention or training or treatment. The initial number of citations from all searches was 183 after duplicates were removed. After the title and abstracts of the articles were

reviewed, 59 articles remained. The full-text version of each of the 59 articles was located and skimmed for context. Further analysis of the articles revealed that 39 met the inclusion and exclusion criteria. The reference lists of literature reviews and meta-analysis pertaining to ASD interventions were also examined for other relevant articles.

Inclusion and Exclusion Criteria. Studies were included if they were published in peer-reviewed research journals in English; if they evaluated the effects of a social communication skills intervention (including both group designs and single case research designs); if at least one of the participants was 13 years old or older with a diagnosis of ASD, which includes autism, Asperger's, and PDD-NOS; and if the research was published between 1983 and 2022. I chose 1983 because the earliest studies about social communication skills were published in 1983.

The exclusion criteria were as follows: studies were not published in peer-reviewed journals, studies used a qualitative design, all of the participants were 12 or younger, the participants did not have a diagnosis of autism spectrum disorder, and studies were published in languages other than English.

The studies are organized in a manner similar to Screiber's (2011) literature review of social skills intervention for children with ASD based on the types of intervention. The following are the types of interventions and the subsequent categories for which the articles are organized: manualized instructional programs, nonmanualized instructional programs, peer mediated, scripts and script fading, technology, and cognitive based intervention. Table 1 presents participants' characteristics in the studies reviewed, including age, gender, diagnosis, intellectual functioning, and the setting in which the study took place. Table 2 presents descriptions of characteristics of studies reviewed, including research design,

intervention, target skills, measures, and key findings. In Tables 1 and 2, the studies are listed in the order in which they are discussed in this section of the review.

Major Findings of the Studies Reviewed

Types of Interventions

Manualized Instructional Programs. Eight studies fit into the category of manualized instructional programs intervention. Barnhill et al.'s (2002) study involved 8 weeks of one-hour social skills instruction followed by a recreational activity in the community each week. The researchers adapted lessons from Duke, Norwicki, and Martin's Teaching Your Child the Language of Social Success. Barnhill et al. (2002) used a one-group, pretest-posttest design. The social skills group provided instruction on the following: paralanguage, identifying and responding to the facial expression of others, and maintaining eye contact. To evaluate the effectiveness of the program, the formal assessment Diagnostic Analysis of Nonverbal Accuracy 2 (DANVA2; administered preintervention and postintervention) and a survey distributed to the parents and participants (administered postintervention) were used.

DANVA2 revealed no significant improvements at the conclusion of the intervention (Barnhill et al., 2002). Despite these findings, the researchers noted that participants were able to identify the emotions and paralanguage of others in the community, but often they did not know how to respond appropriately. The participants' surveys revealed that most of them felt they developed friendships and would call the other participants to get together. The parents' surveys said they were satisfied with the program and wanted it to continue. After several months following the conclusion of the program, 50% of the participants had reported contacting another member.

Davis et al.'s (2010) study evaluated the effectiveness of the Power Cards strategy in increasing the time spent engaged in other's focused conversation for three participants with a primary diagnosis of Asperger's. The researchers used a multiple-probe design across participants. Davis et al. provided direct instruction on others-focused conversation in a group format. The skill had four steps: greet the person by name, ask about their interest and wait, ask a question about their interest, and listen for key word and comment using the key word; each step was demonstrated and the rationale behind it explained. Then the participants received one-on-one instruction on the Power Cards and practiced using the Power Cards in a conference room with a typically developing peer. Generalization probes occurred in the general education classroom, but the situation was not natural. The teacher assigned a conversational partner to the participant and directed them to a specific area in the classroom. The participant and the peer were given a card with written instructions to engage in a conversation for 15 minutes. That did not resemble a conversation that naturally occurs in a general education classroom, but the exercise was more valuable than being in a conference room.

Findings suggested that the three participants in Davis et al.'s (2010) study increased the percentage of time they spent engaged in others-focused conversation (i.e., the four specific conversational behaviors that were taught). Two of the three participants showed an improvement during the generalization probes. It is interesting to note that the participant with the highest reported IQ score (i.e., 101) did not show improvement on the generalization probe. On the social validity survey, all respondents reported that it was important to know how to talk with people. There was a discrepancy between the parents' and the students' rating in terms of the students' ability to engage in casual conversation with classmates. The

students reported that they were able to engage in casual conversations and were undecided on whether they wanted additional conversational instruction. The parents were undecided in their child's ability to engage in casual conversation, and two of the three parents said they wanted their child to receive additional conversational instruction. The students reported that they wanted to have more conversations with their classmates.

Herbrecht et al.'s (2009) study aimed to improve the social and communication skills of individuals with ASD via the manualized Frankfurt Social Skills Training (KNOTAKT). It used a one-group, pretest-posttest design. The participants were divided into groups based on their age and prior social skill instruction and were labeled as follows: naive children's group (8–13 years old), naïve adolescents' group (age 13–19), and experienced adolescents' group (age 13–19). All the groups received the same treatment. The naïve children's group met weekly for one hour (29 sessions), naïve adolescent's group met biweekly for 1.5 hours (15 sessions), and the experienced adolescents' group met biweekly for 1.5 hours (17 sessions). The researchers justified varying the intensity of the intervention by believing the children did not have the attention span for 1.5-hour sessions.

KNOTAKT emphasizes the following skills: initiating social overtures, conversation skills, understanding social rules and relationships, identification, and interpretation of verbal and nonverbal social signals, problem-solving, coping strategies, and improvements in self-confidence (Herbrecht et al., 2009). The intervention consisted of group activities, role playing, discussions, social interaction games, affection recognition, and homework (e.g., calling a group member or classmate on the phone). There were eight assessment instruments for experts (n = 4), parents (n = 3), and teachers (n = 1). All of the assessments were checklists or questionnaires, except for one: the experts' blind ratings of videotaped warm-up

exercises, preintervention and postintervention. For the videotaped exercises, the participants were assessed by a Likert-like scale on the following: reporting their current feelings, retelling a personal event, social communicative quality (e.g., eye-contact, facial expressions), and general clinical impressions. All of the assessments were administered preintervention and postintervention and 5 months after the intervention was completed. The checklist of group behavior (experts) and the social competence scale (parents) was filled out two extra times during the treatment.

Herbrecht et al. (2009) reported that on average, the participants improved on all measures. Large effect sizes occurred on the following measures: questionnaire for the assessment of group behavior given to the teachers, which only five teachers completed; global assessment of functioning completed by experts; diagnostic checklist for pervasive developmental disorders completed by experts; social competence scale completed by the parents; and modified parent interview for autism completed by the parents. The blind video assessments, which were the study's most objective measurement, showed a small effect size with nonsignificant findings. According to the researchers, the most significant finding was the improvement of the autism symptom level.

Hillier et al.'s (2007) study sought to improve the social and vocational skills of adults with ASD through a support group format that involved no direct instruction; the researchers called the program Aspirations. It was a one-group, pretest-posttest design. The participants met for an hour each week, over a period of 8 weeks, to share, listen, problem-solve, and provide advice relating to their experiences. Over the 8 weeks, the following topics, each with a set of guiding questions, were discussed: employment, friendships, interpersonal problem-solving, general problem-solving, social communication, and theory

of mind. The instruments used to evaluate the program were self-report measures (modifications of the *Index of Peer Relations* [IPR], *Autism Spectrum Quotient* [ASQ], and *Empathy Quotient* [EQ]), structured observations of the type and frequency of interactions, and informal feedback from participants and parents. All of the assessments were done preintervention and postintervention, except for the informal feedback, which occurred only after the completion of the intervention.

Of the three self-report measures, statistically significant improvements were found only on the EQ; the participants' empathic skills improved (Hillier et al., 2007). The structured observations revealed that toward the end of the program, there were more contributions from the participants. Additionally, as the program progressed, the participants became more open with one another and showed more respect for differing perspectives. The participants said they made friends and appreciated the opportunity to meet other individuals diagnosed with ASD. The parents saw an improvement in their children's desire to interact with others, their initiation to find jobs, and pride in their appearance. After the program was over, the group continued to meet monthly.

Ko et al. (2019) assessed the effectiveness of using the Social Tools and Rules for Teens (START) socialization intervention for adolescents with ASD. A randomized controlled trial was used with observational data used to assess for improvement. It was a 20-week study, with 5 min of one-on-one instruction prior to the group instruction. Each week, the participants received 90 min of instruction. The format of the intervention was as follows: 5-min one-on-one practicing with a facilitator on the targeted behavior identified for each participant; 20 min of free socialization with the group; 40 min of instruction on a social topic, including role playing and watching video-clips; 20 min of a structured activity; and 5

min of review. The group consisted of four to six participants, two high school peers, and four undergraduate facilitators. Two 5-min conversations with unfamiliar peers were recorded and later coded preintervention and postintervention. Five second partial interval coding scheme was implemented to code for the presence or absence of the following three behaviors: questions asked, positive facial expressions, and mutual engagement. The results indicated there were significant findings for two of the three dependent variables (i.e., questions asked and positive facial expressions). The researchers noted that one of the limitations was that only three social skills were measured and that any inappropriate social skills (i.e., off-topic comments) were not accounted for in the data. The results are promising, and that study was one of the first randomized controlled studies to use systematic coding of conversations to report improvement on outcome measures.

Scattone et al. (2006) assessed the effectiveness of using social stories to increase appropriate social interactions of three male individuals diagnosed with ASD using a multiple baseline design across participants. Initially, the teacher read the social stories to the participants and asked predetermined, comprehension questions. Once the participant was able to answer the questions with 100% accuracy, the social story intervention was implemented. The intervention consisted of having the participant read the social story or having the teacher read the social story to the participant once a day prior to a free-time activity. The free-time activities took place in the cafeteria, classroom, and outdoors (i.e., just outside the classroom).

In Scattone et al.'s (2006) study, the appropriateness of the participants' social interaction was assessed via direct observation. Partial interval recording was used during 10-min observation sessions. The results varied for each of the participants. One participant had

a clear increase in the number of appropriate social interactions. The other showed only modest improvement, which could have been due to the fact that he often resisted reading the story or having it read to him. He also was resistant in much of his academic tasks. Another participant did not show improvement, but the authors noted that the classroom environment might have been a factor. Three times, that participant initiated social interaction with his peers, and his peers ignored him. Additionally, many of the other students in the class engaged in inappropriate and disruptive behaviors. Scattone et al. (2006) also assessed social validity by having the teachers fill out the *Intervention Rating Profile* (IRP-15). The teachers rated the intervention as acceptable.

Turner-Brown et al.'s (2008) study sought to improve the social-cognition and social functioning of individuals with ASD by modifying the Social Cognition and Interaction Training (SCIT) program. It employed a nonequivalent control group pretest-posttest design with an intervention group and a treatment-as-usual (TAU) group. Intervention sessions were held once a week, for 18 weeks, for approximately 50 min each. To assess social cognition, the following measures were used: face emotion identification task (emotion perception) and hinting task (theory of mind). To assess social functioning, the *Social Communication Skills Questionnaire* (SCSQ) and *Social Skills Performance Assessment* (SSPA) were used. The SSPA is a role-play assessment, and the raters were blind to the group status and to pretreatment and posttreatment status. All of the assessments were given to the intervention and TAU groups preintervention and postintervention. A short questionnaire was given to participants, postintervention, to gather feedback related to their satisfaction with program.

For social cognition, the intervention group, in relation to the TAU, had the following results: a large effect size for the face emotion identification task and significant

improvement on theory of mind skills (Turner-Brown et al., 2008). With regards to social functioning, the intervention group, in comparison with TAU, had the following results: improvements in perceived social communication skills as measured by the SCSQ and no significant changes in observed social skills during the role plays. On the questionnaire, the majority of the participants reported high levels of satisfaction and said they appreciated having the opportunity to meet with other people with ASD. They also said they would have liked the program to last longer and to have had more opportunities to practice the learned skills outside of the structured group setting. The participants demonstrated improved insight into social situations but often were unable to apply it to their own life. Generalization and maintenance were not assessed in this study.

Webb et al.'s (2004) study sought to assess the effectiveness of the SCORE Skills: Social Skills for Cooperative Groups Strategy Program in teaching five social skills necessary for cooperative group work: sharing ideas, complimenting others, offering help and encouragement, recommending changes nicely, and exercising self-control. They employed a multiple baseline across skills design and did not employ visual analysis. The participants met two times a week for 60 minutes over a period of 10 weeks. The first three sessions were for obtaining preintervention data, followed by 13 treatment sessions, and during the last four sessions, the postintervention data were collected and there was a party. The intervention consisted of any introduction to social skills (one session), instruction on the five core skills (10 sessions), and how to use all five skills together (two sessions). Each of the five core skills was taught over two sessions; the first session was direct instruction, and the second was a review and an opportunity to practice the skill. Each skill consisted of one to three steps accompanied by body language expectations (i.e., sound pleasant, pleasant

expression, and make eye contact). Direct instruction, discussion, modeling, verbal practice, and role playing were used to teach the skills. Table games and puzzles were used to provide opportunities for the participants to practice the learned skill.

Several measures were used to evaluate the effectiveness of the program. The *Skill Knowledge Survey, Situation Discrimination Test, Subject Opinion Survey,* and *Social Skills Rating System* (SSRS) were given preintervention and postintervention (Webb et al., 2004). The *Skill Knowledge Survey* was used to assess the participants' knowledge of the five skills, and the *Situation Discrimination* Test was used to determine if the participants could apply that knowledge to identify the skill to use in a particular situation. The *Subject Opinion Survey* measured the participants opinions related to working in small groups at school. The *Social Skills Rating System* is a norm-referenced assessment of a child's social behavior and was given to one parent of each of the participants. Additionally, the participants were assessed on their ability to perform the five social skills during role plays (preintervention and postintervention). After the completion of the intervention, the participants and parents were given Subject Satisfaction Questionnaires to rate their overall satisfaction with the program and the degree to which it helped them or their child.

According to Webb et al. (2002), the participants showed significant improvements in demonstrating all of the five skills, during role plays, except for the sharing ideas skill. The participants significantly improved in their knowledge of the five skills and application of that knowledge in written scenarios. There was no significant improvement in the participants' opinion about working in small groups with their classmates at school. There was no significant difference preintervention and postintervention on the overall scores of the *Social Skills Rating System* completed by the parents; however, significant differences were

found on some of the individual questions. The results of the satisfaction questionnaires indicated that both the parents and participants were satisfied with the program and believed it had benefited them or their child.

Nonmanualized Instructional Programs. Eight studies fit into the category of nonmanualized instructional programs intervention. Broderick et al.'s (2002) study sought to integrate individuals with ASD into community youth clubs by providing instruction in direct social skills and additional support while attending the youth clubs. The study's design was a one-group, pretest-posttest design. The participants attended a weekly social skills group for 8 weeks; one time prior to starting the youth club, while attending the youth club, and once after the adult support left. During the social skills group, direct instruction was provided on conversational skills, eye contact, body posture, expressing and recognizing nonverbal signals, conflict resolution skills, rescue comments, and relation techniques. In addition to the social skills group, the participants attended youth clubs in the community. Trained adult volunteers attended the youth clubs with the participants for 6 weeks, providing redirection and support when needed. Prior to volunteering, the adult volunteers were given eight hours of social skills training.

Broderick et al. (2002) used questionnaires to assess the participants' social skills and self-esteem. The questionnaires were given to the parents, participants, teachers, and adult volunteers. The researchers kept track of the attendance at both the social skills group and the youth groups in the community. At the conclusion of the program, the majority of the participants reported an increase in confidence and self-esteem. A little more than half of the participants said they thought they could make new friends easier as a result of the intervention. By the conclusion of the study, the adult volunteers reported that the

participants required little support while attending the youth club. There was no follow-up data regarding whether the participants continued to attend the youth groups without the adult support. However, the researchers said they intended to follow up on the participants' progress. The study's intervention has potential, but more information and more formal assessments are needed to determine the long-term effectiveness of such an approach.

Howlin and Yates's (1999) intervention was designed to give participants a better understanding of their social difficulties, to improve their conversational skills, and to encourage greater independence in their work and living situations. The study employed a one-group, pretest-posttest design. The intervention was a social skills group in which participants met monthly for 1 year for 2.5 hours per session. They participated in group activities; structured games; role playing; and at times, the role plays were videotaped to provide additional feedback. Real-life problems that the participants encountered also were discussed to foster positive problem-solving skills.

Assessments to evaluate the effectiveness of the program included role playing two scenarios preintervention and postintervention (Howlin & Yates, 1999). One role-play scenario was of a social party, and the other involved a phone call to a prospective employer about a potential job. For the first scenario, a social party, the following types of utterances were recorded: conversation maintaining/initiating, general statements, appropriate responses, inappropriate utterances and repetitions, and other. For the second scenario, work related, the following utterances were assessed: offering/requesting information, appropriate responses, inappropriate utterances, social utterances, and other. The role plays assessed both the frequency of conversation speech and the type of utterances that occurred. In addition to

the role plays, checklists were completed by the parents and participants postintervention to gauge the skills in which they believed the participants improved.

Findings suggested that the amount of conversational speech did not change preintervention or postintervention, but the types of utterances changed (Howlin & Yates, 1999). In the party scenario, repetitive utterances decreased, and initiating/maintaining conversation utterances increased significantly. In the job scenario, inappropriate utterances decreased, and appropriate responses to requests for information increased significantly. The families reported improvements in their child's conversational and social skills, confidence, appearance, and overall independence. The majority of the families said their sons improved in their ability to problem-solve, make decisions, and maintain friendships. All but one of the participants reported an increase in communication skills, ability to interpret emotions, and relate to other people. The participants said the group was helpful because it provided a place where they could meet and listen to others who had similar problems. The majority of the individuals in the group increased their level of independence in either their living situation, gaining employment, or enrolling in further education.

Hughes et al. (2011) had four primary purposes: to determine if a communication book could be used to promote reciprocal and naturalistic conversational interactions between participants and peer, to determine if the conversational partner's role would expand during generalization, to conclude if communication books could be used with participants with a wider range of communication skills, and to determine if the use of communication books could generalize across partners and settings. The researchers utilized a multiple baseline design across settings and participants, with multiple probes. The intervention consisted of training the participants to use a communication book to initiate interactions

with peers. The researchers provided a rationale for the intervention and used direct instruction to teach the participants how to turn the pages in a book and to either read a question or point to a picture. The communication partners were trained to use the communication book, how to expand on the conversational topics and ask questions, and how to provide prompting when necessary. The interaction between the participant and communication partner occurred during lunch and in general education classrooms.

Hughes et al. (2011) assessed the following: percentage of intervals in which social interaction occurred, the percentage of intervals in which participant and peer initiations and responses occurred, the effect of the participant and peer during the interaction, the quality and reciprocity of the interaction, the participants' goals and their perception on whether they reached them, and the acceptability and effectiveness of intervention. Direct observation was conducted to assess the targeted skill in a natural setting. The researchers interviewed participants preintervention and postintervention and had the communication partners complete a written questionnaire postintervention.

Hughes et al. (2011) reported numerous positive results. The percentage of intervals in which social interaction occurred between the participants and the peers increased across settings and peers. The participants and partners both increased their initiations and responses. In this study, the conversational topics that occurred were similar to those of typical high school students' conversations. Overall, the affect ratings were considered positive. It is interesting to note that conversational partners' affect ratings were higher when the participants had limited verbal skills. In terms of the quality of the interaction, the mean ratings were high, but the reciprocity of the interactions varied. After the intervention, the participants reported that they had more friends, that the communication book was helpful,

and that they enjoyed using it. The communication partners had positive perceptions of the social interactions.

A study by MacKay et al. (2007) implemented an intervention that sought to improve social and emotional perspective taking, conversation skills, and friendship skills in individuals with ASD. It was a one-group, pretest-posttest research design. The participants were divided into six groups and met weekly for 1.5 hours. Two groups met for 12 weeks, and four groups met for 16 weeks. All groups received the same intervention. The intervention consisted of reviewing the schedule for the session, small-group and large-group activities (i.e., games, discussion, role play, independent choice), and free time at the end to practice what was learned in a less structured environment. The groups also were assigned homework and participated in outings into the community. The researchers held regular feedback meetings with the parents to discuss the participants' progress and to aid in generalization of the learned skills. Three types of measures were utilized to assess the effectiveness of the intervention: the *Spence Social Skills and Social Competence Questionnaires* filled out by the parents and some participants preintervention and postintervention, parents determining three things they wanted their child to work on and assessing on an 11-point Likert scale whether these three things improved after intervention, and follow-up interviews with the parents.

Findings suggested that significant gains were made following the intervention, with the effect sizes ranging from medium effect to substantial effect on all of the questionnaires (MacKay et al., 2007). As for the three elements each parent picked, 65% of them were reported to have increased. The follow-up interviews revealed that the majority of the parents said the program was helpful. In addition, they said their child had improved socially, they

were grateful for the experience for their child to socialize and would have liked the group to continue. The weaknesses identified by the parents were that the intervention was too short and that it did not address general behavioral problems. One limitation of this study was that due to the parents choosing three things they would like to have addressed in the intervention, the intervention itself was dynamic and varied slightly from group to group. Another limitation was that the outcome measures relied solely on parents' and participants' perspectives versus direct observation of social skills.

Nientimp and Cole's (1992) study evaluated the effectiveness of teachers' using constant-time delay procedures to teach socially appropriate responses to three adolescents with ASD. An ABA withdrawal design was used for two participants, and an AB design was used with one participant. Nientimp and Cole surveyed some of the typically developing students at the school to determine the most common responses to the following greetings: *hi, what's up, hello, yo,* and *hey*. The researchers then taught the participants the most common target responses. Ten-min training sessions were conducted daily and consisted of the following: two practice trials for each of the five targeted responses and 10 discrete trials (i.e., two trials per target response) incorporating constant-time delay procedures. During the training, the participants were with the other participants, and the trainer greeted students one at a time in random order. Generalization probes in which a typically developing peer initiated the greeting were conducted five times throughout the study.

After the intervention, there was an increase in the appropriate responses and a decrease in echolalic responses for all of the participants (Nientimp & Cole, 1992). For the two participants involved in the ABA withdrawal design, it was difficult to determine whether the change in behavior was attributed solely to constant-time delay procedures; the

participants' behaviors did not return to baseline when the treatment was withdrawn. Only one participant was able to generalize the target responses to a typically developing peer. This study suggests that constant-time delay procedures could be used to teach specific responses to greetings in a self-contained classroom setting. However, the study did not demonstrate whether the learned skills could be generalized to other settings.

Ozonoff and Miller (1995) aimed to improve the social skills of individuals with ASD by providing direct instruction on theory of mind as part of their overall comprehensive social skills program. It was a nonequivalent, control group, pretest-posttest design that employed a treatment group and a control group. The participants met weekly for 90 minutes for 14 sessions, alternating between meeting in the clinic for instructional lessons and venturing into the community to practice learned social skills. The intervention included direct instruction on social skills (i.e., basic interaction and conversational skills), perspective taking, and interpersonal problem-solving strategies. The researchers also discussed the importance of the skills they were teaching and incorporated the following teaching techniques: modeling, coaching, role plays, and video feedback. The video feedback component consisted of videotaping the students' role plays, having the students watch the videos, and providing feedback to the student. In addition to the participant role playing the social skills they were being taught, the participants also role-played first-order and second-order false belief tasks. The effectiveness of the program was measured by administering the following preintervention and postintervention: the SSRS to parents and teachers and four theory-of-mind tasks to the participants.

No significant difference was found on the SSRS preintervention and postintervention for the intervention group (Ozonoff & Miller, 1995). However, the intervention group

improved on the theory-of-mind tasks. Eighty percent of the participants in the intervention group demonstrated improvement on the composite scores of the theory-of-mind tasks whereas only 25% of those in the control group showed improvement. The study found that individuals with ASD can be taught to perform theory-of-mind tasks, but no generalization was demonstrated in the study.

Rose and Anketell's (2009) study involved 5 weeks of social skills instruction in a group format. It was a one-group, pretest-posttest design. Five topics were covered: recognizing emotions, making conversation, nonverbal communication, definition of a friend, and the difference between friends and bullies. Each session followed the same routine and incorporated ice-breaker games, direct instruction with a creative component (i.e., drawing, role playing) and a snack break. The participants also were given written homework. The participants were divided into four groups based on their age and cognitive ability, yet each group received the same intervention. The assessment measures were: a parent focus group, nonstandardized questionnaires completed by the parents preintervention and postintervention and 6 months following the group, participants evaluations completed at the conclusion of every session, facilitator observations, and cost analysis that compared the expense of running the group versus individualized instruction.

Rose and Anketell's (2009) focus group attended by five parents revealed the following themes: the opportunity to form friendships and interact with others who have ASD was invaluable, that all of their children lacked friends despite showing a strong desire to have them, their children had difficulty applying the learned skills in real life, some groups appeared to bond more than others, and some of their children had trouble completing the homework. The parents' questionnaires indicated that most of the participants' difficulties

remained the same and that no changes occurred in their child's social behavior at the conclusion of the group. The majority of the parents reported that the sessions were useful and that their child also considered them helpful. Parents reported that friendships were developed and that there was a need for continued social skill training. The participants' evaluations indicated that the vast majority found the sessions useful. The facilitators observed that over time, the participants interacted more with one another and that some exchanged phone numbers. It was also noted that the supports currently in place were not sufficient to handle challenging behaviors. In terms of cost effectiveness, group social skills instruction is more cost effective than one-on-one instruction.

Tse et al.'s (2007) study examined the effectiveness of a social skills intervention with 46 adolescents with ASD. The intervention included 12 weekly sessions, with each session lasting 1.5 hours. It was a one-group, pretest-posttest design. The participants were separated into six groups, but each group received the same intervention. The intervention involved direct instruction of specific social skills, role playing, and group activities (e.g., charades). During one meeting, the participants visited a semiformal restaurant in the community to practice proper etiquette. Three questionnaires (*Social Responsiveness Scale [SRS], Aberrant Behavior Checklist [ABC], and Nisonger Child Behavior Rating Form [N-CBRF]*) were given to parents preintervention and postintervention to measure the effectiveness of the program and whether the participants could perform the learned skills in a home environment.

Results of the questionnaires indicated significant improvements in social competence and in many problem behaviors (Tse et al., 2007). On the SRS, which measures social competence, significant improvement was noted on total score, social cognition, social

communication, social motivation, DSM social aspects, and DSM language aspect. In terms of problem behaviors, all of the scores (i.e., total and all of the subscales) improved significantly on the ABC. The same was true for the N-CBRF, except for the Hyperactive subscale, on which the participants did not improve. Overall, the parents and participants were happy with the social group. The parents reported varying degrees of social behavior improvement in their child, from "the same" to "very much better" (Tse et al., 2007, p. 1965). Most parents said they wanted the group to continue.

Peer-Mediated Interventions. Four articles fit into the peer-mediated instruction category. Haring and Breen (1992) conducted a single-base design study to evaluate a peer-mediated social network intervention on the social integration of adolescents with moderate and severe disabilities, including ASD. A multiple baseline design across participants was used. There were two adolescents in the study, and each had a support network. Peers who had contact with the target students were asked to recruit friends to help in the support network. The support network was set up to facilitate successful social interactions for the target students and to provide opportunities for friendships to develop. The peers met once a week with an adult facilitator to allocate times when they would spend time with the target student, set up goals for skill improvement, discuss ways to facilitate appropriate social interaction, and to problem-solve complications that might arise. The peers met with the target students during passing periods and lunch. The adult facilitator met with the target student twice a week, for 15 minutes, to provide direct social skill instruction (e.g., initiating strategies, appropriate responding).

The peers collected data during their interactions with the target student on the frequency of social interactions between the target student and the peer (during scheduled

and nonscheduled times) and on the frequency of appropriate social responding from the target student (Haring & Breen, 1992). The researchers also made note of the quality of the interactions by circling the appropriate adjective on the data sheet (i.e., good, OK, not good). The researchers collected data on the number of times social interactions between the target student and the peer occurred outside of the school setting. The researchers collected informal and formal feedback from the target students and peers on their satisfaction with the program.

The results of Haring and Breen's (1992) study suggested that both target students increased the frequency of their social interactions with peers once the intervention began. For the participant with autism, this higher level of interaction decreased during the maintenance phase, but it was still well above baseline levels. For both students, a greater number of appropriate responses occurred once the intervention began, and that level was maintained during the maintenance phase. Additionally, friendships were formed, and social interactions outside of school occurred for both of the target students after the intervention began. That was significant because it showed that the friendship that formed generalized to other settings outside of school. There were high levels of satisfaction by everyone involved.

A study by Hughes et al. (1996) had four purposes: replicate the effects of a conversational interaction intervention, use multiple objective and subjective measures to identify target behaviors, select participants who likely would benefit from the intervention, and assess social validity of the intervention. The intervention was peer mediated because typically developing peers deliver direct instruction to targeted social skills. The researchers utilized a multiple baseline design across participants to examine the effectiveness of using a multiple-exemplar, self-instructional training intervention to teach conversational skills (i.e.,

initiation, eye gaze) to four adolescents with moderate intellectual disabilities, and one of the participants also had a diagnosis of autism. The typically developing peers taught the participants to prompt themselves (i.e., self-instruction), thus eliminating a need for an external prompter during social interactions. The self-instruction involved four prompting statements: stating the problem, stating the response, evaluating the response, and self-reinforcing. The peers first modeled the use of self-instruction while engaging in "correct talking," and then the participants practiced correct talking with the peers verbally providing the self-instruction. Lastly, the participants practiced correct talking while self-instructing. As part of the intervention and by using a pool of 50 conversation starters identified by peers as appropriate, the participants were taught different ways to initiate a conversation. The participants practiced self-instruction and correct talking in two settings, a step that was intended to aid in generalization. The generalization probes took place in natural settings (e.g., lunch).

Hughes et al. (1996) used multiple assessments, such as direct observations, interviews, questionnaires, and behavioral ratings, to identify target behaviors, to select participants who likely would benefit from the intervention, and to assess social validity and effectiveness of the intervention. Direct observation of participants performing the targeted skills was conducted during baseline, intervention, and generalization probes. The participants were interviewed preintervention and postintervention to identify their social goals and their perceptions of their social skills. General-education students were interviewed to help identify the social skills they viewed as important. Questionnaires were completed by general-education and special-education teachers and students, lunchroom staff, and cleaning staff to identify social skills they also believed were important. Parents, special-education

peers, teachers, and teachers' aides completed behavioral ratings of the frequency of the targeted behavior of the participants preintervention and postintervention.

Following the intervention, the Hughes et al. (1996) study found that the frequency of the participants' targeted behavior increased to a rate similar to that of their peers. The participants were able to learn the self-instruction technique and to demonstrate it in generalization probes. The participants were able to generalize the learned skill to unfamiliar peers, but the peers were trained and provided prompting to do the self-instruction technique if needed. The participants were perceived by their peers as more socially competent, and the participants also perceived themselves to be more competent.

Krantz et al.'s (1989) study sought to determine the effectiveness of using a peer prompter with ASD, henceforth referred to as peer, to increase the conversational language of individuals with ASD. A multiple baseline design across students was employed. During the intervention phase, the peer was taught to prompt the participants to engage in sports conversations. During the study, the peer and the participants listened to one of three tapes that contained recordings of previously taught sports information. While listening to the tapes, the participants were provided with written scripts of the presentation and were asked to silently read along. After the 3-minute recording was finished, the teacher had two of the participants to return to class while the remaining peer and participant were asked to sit and talk. The peer was trained to ask sports-related questions of the participants. The peer and participant were observed for 5 minutes by independent observers collecting data. A time-sampling procedure was used to determine whether sports conversations occurred during the thirty 10-second intervals (total of 5 min). The percentage of time intervals spent engaged in sports conversation was calculated and graphed for the baseline and intervention conditions.

Results of the study indicated an increase in the conversational language of the participants when the peer acted as a prompter (Krantz et al., 1989). For the three students, the percent of intervals spent engaged in sports conversation dramatically increased once the peer prompter was introduced. This increase also occurred across all generalizing conditions and was maintained at a 1-month follow-up. I am curious if the peer maintained his role as prompter when no direct instruction to do so was provided (i.e., during the group session and after instruction on the new sports topic). If so, that element might account for some of the skill maintenance and generalization evidenced by the participants in these conditions (i.e., during the group session and after instruction on the new sports topic). Of importance is the content of the sports conversations: It was nearly identical to the information previously taught and presented on the tapes. This study did not demonstrate generalization across natural setting, as all of the generalizing conditions were highly structured and occurred in segregated classrooms.

Morrison et al.'s (2001) study was designed to use peer mediation strategies to increase the social skills of four individuals with ASD. A multiple baseline design across skills with a counterbalanced reversal design and an alternating condition for self-monitoring and peer monitoring was employed. Both self-monitoring and peer-monitoring strategies were used to teach three social skills (i.e., requesting, commenting, and sharing).There were four groups, and each consisted of one participant and two or three typically developing peers. Intervention sessions were conducted three times a week for 20 to 30 min each. The intervention consisted of a 10-minute direct instruction and practicing either self-monitoring or peer monitoring and 10–15 min of playing games using either self-monitoring or peer monitoring of the targeted social skill. Tangible rewards were provided during the sessions.

The training occurred in areas of the school that typically were used for small-group activities or during free time (e.g., conference room, areas between classrooms).

Findings suggested that during the intervention, the participants increased social initiations, responses, and usage of the targeted skills (i.e., requesting, commenting, and sharing; Morrison et al., 2001). The participants decreased and/or maintained low levels of inappropriate behaviors. Generalization probes during lunch and/or recess showed that two participants increased their initiations and social interactions with peers. Anecdotal information suggested that two participants used novel phrases for requesting, commenting, and sharing, whereas the other two participants used primarily trained phrases. Self-modeling and peer modeling were found to be equally effective.

Scripts and Script Fading. Four studies fit into the scripts and script fading intervention category. Argott et al.'s (2007) study utilized script-fading procedures to teach three adolescents with autism to provide empathic statements in response to facial and gestural cues. The study employed a multiple-baseline design across subjects with generalization probes occurring every session. Each generalization probe had a novel instructor. The intervention occurred three times a week for 15 minutes, and once criterion was reached, script-fading procedures began. Three emotions (i.e., hurt, tired, happy/excited) were targeted during the intervention, and for each emotion, two scripted responses were taught. For one participant, the written scripts were not sufficient to produce the targeted response, and thus, audio scripts were introduced. Follow-up data were collected 6 weeks after the script-fading procedures had been completed. All participants showed improvements in scripted and unscripted responses well above baseline, even for the

generalization probes. Data collected during follow-up indicated that the skills were maintained.

Gaylord-Ross et al. (1984) used training scripts and task analysis to teach three individuals with autism to initiate and sustain longer social interactions with their typically developing peers. The study consisted of two experiments, both with a multiple baseline design across objects. The first experiment consisted of two males with a dual diagnosis of autism and an intellectual disability. The second experiment had one male diagnosed with autism. The researchers incorporated nonverbal activities (i.e., Pacman portable videogame, Walkman, gum) to enhance and help facilitate social exchanges between the participants and their typically developing peers. In the first experiment, the individuals were first taught how to operate the objects (e.g., play the video game), followed by specific social skills training. In the second experiment, the participant was taught how to operate the objects and simultaneously received social skills training. In both experiments, the researchers performed a task analysis of social exchanges that incorporated the three objects and developed training scripts for the participant and a peer trainer. In the first experiment, there were six peer trainers, allowing for generalization across people to occur as part of the intervention. The second experiment included only one peer trainer.

In the study by Gaylord-Ross et al. (1984), the social skills training occurred in both the special education classroom and in the courtyard (with just the participant and the peer trainer). Generalization probes occurred in the courtyard during normal breaks in the school day where there were both familiar and unfamiliar typically developing peers. However, the peer trainers were not present. Direct observation was conducted on the following behaviors: the frequency of social initiation, duration of social interaction (i.e., seconds), peer

interaction (i.e., peer tutor from class, familiar, unfamiliar), and the type of interaction that occurred (object centered versus nonobject centered). Participants in both experiments increased their social initiations and durations of social exchanges. The participants interacted more frequently with familiar, typically developing peers than with unfamiliar peers. All three participants were able to generalize the learned skill to other typically developing peers.

Ross (2002) used a reversal design (ABA) to examine the use of scripts to decrease faulty responses and to increase appropriate responses for three individuals with autism. There were three primary purposes of the study to determine the function behind the faulty responses, to evaluate the effectiveness of textual prompts (e.g., "comment," "give a compliment") and scripts to increase appropriate responses, and to examine the effectiveness of a token economy to decrease faulty responses. For two of the participants the intervention took place in an empty classroom, and for another, the intervention took place in a dining room and a therapy room at the university. A modified functional analysis was used to determine the function of the faulty response. Functional communication training (FCT) utilizing scripts and textual prompts was then implemented to teach appropriate responses and reciprocal conversations in which the participants were the initiator. A token economy also was implemented.

Ross (2002) assessed the participants' responses to questions, statements, faulty responses, and conversational units. The functional analysis revealed that primary purpose of the faulty behavior was to gain attention in all three situations. The scripts were effective in increasing appropriate responses and in generating appropriate novel responses. It is important to note that the participants initially found it difficult to generalize the scripts to

different people. The token economy was effective with response cost being effective in decreasing faulty responses. For one of the participants, the results suggested that removing attention was more effective than removing tokens. Overall, this study presented preliminary data that scripts were effective in increasing appropriate responses in individuals with ASD.

Stevenson et al.'s (2000) study used audio scripts with systematic fading procedures to teach conversational skills to four individuals with ASD. A multiple probe design was utilized, and data were recorded by observers in the classroom. The highly structured intervention included the following materials: Language Master and cards that provided an audio script, a foam display board with photographs depicting social and nonsocial activities, activity schedule book, and materials located on a nearby bookshelf and focusing on nonsocial activities. Graduated guidance was used when needed to help the participants complete the following tasks to open the schedule book, to select a photograph from the foam board, to place the photograph in the book, to obtain any needed materials, to complete the task, to return any materials used, and to select another photograph. This process continued until all of the photographs (i.e., five nonsocial activities and five social activities) were used.

The social activity, the primary focus of the intervention, involved initiating a conversation with an adult recipient and completing approximately four exchanges (Stevenson et al., 2000). The recipient was located in a corner of the room with the Language Master and cards on a clipboard stationed on their lap. When a social activity was chosen, the participant would approach the adult recipient, slide the card through the Language Master, and an audio script would play. Once a preset criterion was reached, the script-fading procedures began.

During the teaching and maintenance phase of the intervention, all participants increased and maintained their unscripted interactions to well above baseline (Stevenson et al., 2000). At the conclusion of the study, the participants' teachers were trained in the intervention procedures, and new scripts were introduced into the classroom. The results of the study showed that audio scripts and script-fading procedures were a treatment option for individuals with ASD who could not read written scripts.

Technology. Five studies fit into the technology intervention category. Golan and Baron-Cohen's (2006) study consisted of two experiments designed to assess the effectiveness of Mind Reading, an interactive multimedia computer program, in teaching adults with ASD to recognize emotions and mental states. Mind Reading taught emotions through silent video clips that showed facial expressions, voice recordings, and written scenarios that depicted situations in which target emotions were likely to occur. Both studies used a nonequivalent, control group, pretest-posttest design. In each experiment there were three groups: the treatment group, the AS/HFA control group, and the typically developing control group.

In Golan and Baron-Cohen's (2006) first experiment, the treatment group was asked to use the Mind Reading software for two hours a week over 10 weeks; the AS/HFA control group did not receive the Mind Reading intervention. In the second experiment, the treatment group attended a small group once a week and used Mind Reading at home, as did the participants in the first experiment. The small group's activities were to discuss the distinguishing features of facial expressions and voices, to review real-life situations and their associated emotions, and to look at emotions depicted in newspaper photos and film clips. The AS/HFA control group attended a social skills meeting once a week for 10 weeks

and covered the following topics: conversational rules, emotional expressions, body language, job interviews, and friendships.

The outcome measured for both of Golan and Baron-Cohen's (2006) experiments involved assessing three types of generalizations: close, feature-based distant, and holistic distant. Close generalization involved assessing emotions in faces and voices that were depicted in Mind Reading, but the information was presented via a different computer software program. Feature-based distant generalization tested emotion recognition in faces and voices that was not included in mind reading. In close and feature-based generalization, emotional recognition in faces and voices were presented and assessed separately. Holistic distant generalization assessed emotion identification in scenes from feature films in which all elements (i.e. faces, voices, body language, context) were integrated.

In both experiments, when compared with the AS/HFA control group, the treatment group improved significantly on close generalization, but no difference was found on feature-based and holistic distant generalization (Golan & Baron-Cohen, 2006). Thus, improvements occurred only with stimuli directly taught. In the first experiment, the AS/HFA control group improved significantly on one of the subtests of the close generalization: recognizing emotions in faces. One explanation to account for this improvement is that the process of testing raised awareness in the participants. The AS/HFA control group did not show significant improvements in recognizing emotions in voices in close generalization or in any other distant generalization task. In both experiments, a significant correlation was found between software usage time and improvement in recognizing emotions in films.

LeBlanc et al. (2003) examined the effectiveness of video modeling and reinforcement in teaching perspective taking to three individuals with ASD using a multiple

baseline design across tasks. The participants watched a video of an adult completing a task correctly. The video was paused to allow the participants to answer perspective taking questions. Correct responses were reinforced with tangible rewards (i.e., sticker, food) and verbal praise. When the participant answered the question incorrectly, the segment of the video was shown again. Following the video, the testing of the tasks occurred. Three tasks were used to assess perspective taking: M&M's, Hide and Seek, and Sally-Anne. Results suggested that the intervention of video modeling and reinforcement was effective in increasing perspective-taking skills for children with autism.

Mitchell et al.'s (2007) study evaluated virtual environments (VE) for teaching social understanding to adolescents with ASD. Three participants completed the VE sessions at Time 1 and Time 2 between video assessments, and the other three participants had their VE sessions at Time 2 and Time 3 between video measures. The scenario was of a café, and the task was to find a seat. There were four different levels, with each level increasing in difficulty. The VE provided corrective feedback, and a facilitator was present to provide scaffolding when needed. The study involved two VE sessions, each lasting approximately 40 minutes, and three video sessions that involved watching five 30-second video clips.

Findings suggested that learning was generalized because many participants used the concepts they learned in the café VE experience and applied them to the video clips of the café and bus scenarios. Three participants showed the most improvement in social reasoning. Overall, the study results suggested that VE has potential to be effective in teaching social skills to children with ASD.

Nikopoulos and Keenan (2003) evaluated video modeling for increasing the social initiation of individuals with ASD by using a multiple treatments design for six participants

and by using an A-B design for one participant. The intervention consisted of watching 35 seconds of video models from two to five times a day. After watching the video, the participants were led into another room where their behavior was videotaped and later analyzed for two behaviors: the time it took to initiate an interaction with the experimenter and the time spent in appropriate play with the experimenter. In each video, one of three models (i.e., familiar adult, typically developing peer, and an unfamiliar adult) initiated interaction with the experimenter by saying "Let's play" and then proceeding to lead the experimenter to a particular toy. Self-modeling was used with a participant who showed no gains after using the traditional video modeling. Social initiation and appropriate play were assessed. Results suggested that four of the seven participants' social initiation and appropriate play increased following the intervention: the behavior generalized across setting, peers, and toys and that was maintained at the 1-month and 2-month follow-up assessments. Findings demonstrated that video modeling was effective in improving social initiation and appropriate play in structured settings for some individuals with ASD.

By using a reversal (ABCBC) with replication across game partners, State and Kern's (2012) study evaluated video feedback and in vivo self-monitoring to improve social interactions of an individual with ASD. The intervention took place in the school conference room, and the generalization assessments (with no intervention) occurred at home. Two types of interventions were implemented. The first was video feedback, which consisted of the participant watching 5-minute portions of his videotaped sessions recorded the previous day. Every 15 seconds, the videotape was stopped, and the participant recorded whether his behavior was appropriate. The participant then compared his answer with that of the facilitator. Any discrepancies were discussed and explained, and if the participant

demonstrated inappropriate behaviors in the video, the facilitator asked him what he could have done differently. The second intervention was in vivo self-monitoring. During the sessions, the participant wore a vibrating watch set at 1-minute intervals. When the participant's watch vibrated, he was supposed to stop and record whether he engaged in appropriate behavior. At the end of the session, he compared his answers with those of the facilitator. The study highlighted the benefits of video feedback and in vivo self-monitoring. Findings suggested that both interventions were effective in increasing positive interactions. However, in vivo self-monitoring was more effective than video feedback in reducing the participant's inappropriate interactions and noises (State & Kern, 2012). In terms of social validity, the participant responded positively to both interventions but indicated a preference for in vivo self-monitoring.

Cognitive-Based Intervention. Ten studies evaluated cognitive-based interventions for individuals with ASD. Given the fact that Social Thinking® is a cognitive approach, a closer look at each of these studies is warranted. I provide a summary of each along with a brief discussion of their strengths and weaknesses.

Stichter et al. (2010) evaluated the effectiveness of the Social Competence Intervention (SCI), a group-based social skills intervention grounded in cognitive behavioral principles. SCI uses metacognitive strategies, self-monitoring and self-regulation, and exposure and response situations to teach the following skills: recognizing facial expressions, sharing ideas, taking turns in conversations, recognizing emotions of self and others, and problem-solving. The researchers used a one-group, pretest-posttest design. The groups met for an hour, twice a week, for 10 weeks for a total of 20 hours of group intervention. Each group had four, five, or six participants. The intervention involved curricular scaffolding in

which previously learned skills were repeatedly reinforced and incorporated into the skills being taught. The group sessions consisted of reviewing previously learned skills and introducing new skills via instructional and group discussion. The facilitators modeled the targeted skills and provided the participants with opportunities to practice the skills in structured and naturalistic activities.

Findings suggested that the participants made significant gains in social abilities on all subscales of the Social Responsiveness Scale (SRS) reported by parents (Stichter et al., 2010). There were mixed results for participants' performance on the first-order and second-order ToM tests (i.e., Sally-Anne false belief task, Smarties false belief tasks, and The Friends ABC story) and on the task of identifying remarks or actions in short narratives that violated hidden social rules (i.e., Faux Pas Stories). Following the intervention, the number of participants passing the first-order and second-order ToM tests decreased. However, significant improvement was recorded on the Faux Pas Stories. The participants improved significantly in their ability to recognize emotion measured by the Diagnostic Analysis of Non-Verbal Accuracy-2 Child Facial Expressions (DANVA-2-CF) and by the Reading the Mind in Eyes test. Overall, SCI has many positive results and appears to be a promising intervention in teaching emotion recognition.

Schmidt et al. (2011) also examined the effectiveness of the Social Competence Intervention (SCI) on adolescents with ASD. Schmidt et al. replicated many of the findings of Stichter et al.'s (2010) study, which provided further evidence of the potential effectiveness of SCI intervention. Findings suggested that all of the teachers reported on the SRS that the participants' social abilities improved (Schmidt et al., 2011). On the ToM measures, results were mixed; some participants failed the tests preintervention but passed

them postintervention, while others passed the test preintervention and failed postintervention. On the DANVA-2, which assesses emotion recognition, the combined group showed significant improvements. However, no significant changes were recorded on the other measure of emotion recognition (i.e., Reading the Mind in the Eyes test) for the combined group postintervention.

Schmidt and Stichter's (2012) study had two primary purposes. The first was to determine if they could improve the generalizability of the results of a social skills intervention (i.e., SCI-A program) by including a peer-mediated component. The second was to see which peer-mediated intervention was more effective: peer-mediated initiation or peer-mediated proximity. The researchers employed a multiple treatments design (ABCDCD): baseline (A), SCI-A program (B), peer-mediated initiation phase (C), and peer-mediated proximity phase (D). The SCI-A program is based on a cognitive behavioral framework and teaches the following: recognition and expression of facial expressions, sharing ideas, turn taking in conversation, recognizing feelings and emotions in self and others, and problem solving. The program was taught over 21 sessions in a resource classroom. The peer-mediated initiation phase involved having a trained peer sit next to or across from the participant at lunch, get the participant's attention, initiate a conversation or make a comment, respond to the participant's responses, and then repeat the exercise. The peer-mediated proximity phase consisted only of the trained peer sitting next to or across from the participant at lunch and responding to the participant's initiations with one conversational turn. The peer was instructed not to initiate conversation.

Prior to implementation, the peers received four hours of training on the characteristics of ASD and successful strategies and were provided with a brief overview of

the SCI-A program (Schmidt & Stichter, 2012). Once peer-mediated phases began, the peers met with the researchers on a weekly basis, for 6 weeks, to review what they were supposed to do, to answer questions, and to provide the peers with any necessary feedback. The frequency and duration of the participants' initiations, responses, and continuations were recorded through direct observation. Generalization probes occurred in the participants' math classes. The researchers did not assess social validity. Schmidt and Stichter (2012) recorded many promising results. The addition of the peer-mediated component resulted in increased generalization for all three participants. Not only did the participants' social interactions increase above baseline, but they also increased from the levels obtained during the SCI-A intervention phase. That provided support for the effectiveness of adding a peer-mediated component to a social skills intervention. In comparing the two peer-mediated interventions, Schmidt and Stichter (2012) were not able to find a clear distinction between the two.

Begeer et al. (2011) assessed the effectiveness of a manualized theory of mind (ToM) program, The Theory of Mind Training. The Theory of Mind Training covers the precursors of ToM (i.e., perception, imitation, emotion recognition, and pretense), elementary ToM understanding (i.e., belief and false belief understanding), and advanced ToM understanding (i.e., second-order reasoning and the use of irony and humor). Begeer et al. (2011) utilized an independent groups design. The participants met weekly for 1.5 hours for 16 weeks. The participants' parents joined their children during the last 15 min of each session and attended their own five monthly trainings. Some of the topics discussed were listening to others, difference between fantasy and reality, learning to assess a social situation, recognizing other's intentions and emotions, placing one's self in the thoughts and feelings of others, and humor.

Findings suggested a significant difference in emotional awareness, empathy, and social behaviors between the treatment group and control group for the total score and elementary ToM subscale on the ToM test (Begeer et al., 2011). No difference was found between the groups for ToM precursors or advanced ToM subscales on the Theory of Mind test. That finding points to an improvement in the participants' conceptual understanding of ToM and their ability to reason about beliefs and false beliefs. On the Levels of Emotional Awareness Scale for Children (LEAS-C), which involves the participants describing the feelings of themselves and others in 12 hypothetical situations, a significant difference was noted between the two groups for the mixed emotions and complex emotions subscales; the participants improved in their understanding of mixed emotions and complex emotions. However, no improvement was recorded in understanding basic emotions. Additionally, the parents reported no improvement in their child's social behavior on the Index of Empathy for Children and Adolescents, and the participants reported no improvement in self-reported empathy as measured by the Children's Social Behaviour Questionnaire (CSBQ).

Bauminger's (2002) study evaluated the effectiveness of adapting the Interpersonal Problem Solving Model and I Found a Solution social skills program in improving the participants' ability to solve social problems, their emotional understanding, and their social interactions with peers. The intervention's conceptual framework was grounded in cognitive behavior principles. It involved instruction in prerequisite concepts (i.e., what a friend is, the importance of listening to a friend), affective education (i.e., instruction in simple emotions, emotion recognition in self and others via facial expressions, gestures, and vocalizations), and social-interpersonal problem-solving (e.g., how to initiate a conversation, how to comfort a friend). Part of the social-interpersonal problem-solving component involved identifying 13

social skills and working each one through the problem-solving model specified in the adapted curriculum. The teacher was the primary intervention agent, with a typically developing peer providing opportunities to practice the learned skill and the parents providing support at home. Bauminger (2002) utilized a one-group, pretest-posttest design. The intervention lasted 7 months. Each week, the participant met with their teacher for three hours of instruction in the intervention and to learn one of the targeted social skills. Twice a week, the participant met with an assigned peer (i.e., during recess and after school) to practice the newly learned skills, and at home, the parents helped the participant to complete homework assignments (e.g., calling the peer).

There were many positive results in Bauminger's (2002) study. Following the intervention, the participants demonstrated improvements in social problem-solving, understanding emotions, and in their social interactions with peers. In terms of social problem solving, the participants provided a greater number of pertinent solutions and fewer nonsocial solutions on the Problem-Solving Measure (PSM). On the Emotional Inventory, the participants' provided more examples of complex emotions and gave more-specific examples, which indicated an increase in their knowledge of complex emotions. When interacting with peers, after the intervention, the participants were observed to be more likely to initiate positive social interactions. Their eye contact increased along with their ability to share experiences and show interest in their peers. Additionally, the teachers reported improvements on the SSRS following the intervention, chiefly in the areas of assertion and cooperation. While those results are encouraging, it is important to interpret them with caution, due to the weak nature of the research design.

Lopata et al. (2006) sought to investigate the effectiveness of an intensive cognitive behavioral treatment program for individuals with Asperger's disorder. The researchers used a nonequivalent control group pretest-posttest design in which participants received one of two treatment configurations: intervention plus a behavioral treatment component (SS+BT) and the intervention only (SS). The intervention lasted 6 weeks, with the participants meeting 5 days a week for 6 hours a day. The days were split into four 70-minute treatment cycles, with bathroom breaks and a break for lunch. The 70-minute intervention cycles consisted of 20 min of social skills instruction and 50 min of therapeutic activities. The researchers utilized the Skillstreaming program for the majority of the social skills instruction. Skillstreaming has nine steps, which include defining and modeling the social skill, explaining the need for the learned skill, role playing the social skill with feedback, and assigning homework. In addition to Skillstreaming, once a week during the social skills instruction, the researchers provided instruction and practice in interpreting nonliteral statements and idioms and face expression and emotion recognition.

The therapeutic activities portion of the treatment cycle consisted of cooperative activities (e.g., building an object out of glue and craft sticks with one hand behind one's back, thus necessitating the assistance of another person), face-affect recognition activities (e.g., identifying emotions in pictures of people's faces), and interest expansion activities (e.g., researching and creating a book about another participant's interest).

In addition to evaluating the effectiveness of the intervention, Lopata et al. (2006) compared two treatment configurations: intervention plus a behavioral treatment component (SS+BT) and the intervention only (SS). The behavioral treatment consisted of a behavioral management system utilizing points with response cost. The participants earned points for

following rules, demonstrating learned skills, and for prosocial behaviors. They lost points for not following rules and for engaging in inappropriate social behaviors. Points were used to earn edible reinforcements and for field trips scheduled for the end of the week. In the intervention-only condition (SS), only natural reinforcement (i.e., verbal praise) was used.

Findings suggested that both parents and staff reported a significant increase in the participants' social skills as measured by the social skills, adaptability, and atypicality scales of the *Behavior Assessment System for Children* (BASC). Those findings were further supported by anecdotal reports from the parents about their child's improvement (e.g., being more socially aware and attentive to peers). The parents also reported a significant increase in their child's adaptability and a decrease in their child's odd or unusual behavior. The staff, on the other hand, reported no differences in the participants' level of adaptability and observed an increase in their odd or unusual behavior. In comparing the two treatment configurations (i.e., SS and SS+BT), no significant difference was found.

Lopata et al. (2008) replicated and expanded their findings from Lopata et al.'s (2006) study. They compared two treatment configurations using an independent groups design. However, the researchers changed the names of the treatment conditions from intervention only (SS) and intervention plus a behavioral treatment component (SS+BT) to noncategorical feedback (NC) and response cost feedback (RC), respectively. The difference between the 2006 and 2008 studies was that for each participant, the researchers added three or four individualized social behaviors to target. In the RC condition, those added behaviors were reinforced with points and were formally reviewed; in the NC condition, the added behaviors were informally reviewed at the end of the day. In Lopata et al.'s 2008 study, the intervention was the same as the intervention utilized in the 2006 study.

Overall, the results of Lopata et al.'s (2008) study were promising. Both the parents and staff reported statistically significant improvements in the participants' social skills (via the BASC and SS). No difference was found between the RC and NC groups, indicating that both feedback conditions were equally successful in reinforcing participants' social skills. In terms of the participants odd and developmentally immature behavior (i.e., Atypicality subscale of the BASC), the parents reported no significant changes after the intervention, regardless of the RC or NC condition. However, the staff did report an increase in the NC's group atypicality but reported no changes for the RC group. The parents, irrespective of their child's feedback condition, reported a significant decrease in their child's tendency to pull back or avoid social contact with people (i.e., Withdrawal subscale of the BASC). The staff found a difference between the two conditions: the RC group decreased in terms of withdrawal, and no change in withdrawal was reported in the NC group. In terms of the participants' behavioral symptoms, the parents reported a decrease following the intervention. The staff reported an increase in the behavioral symptoms of the NC group and a slight decrease in the RC group. On DANVA-2, no significant change was reported in the participants' ability to recognize emotions from faces.

In their study, Lopata et al. (2008) replicated many of the findings of their 2006 study, most notably the increase in the participants' social skills following the intervention (via parent and staff report). The parent questionnaires showed no difference between the NC and RC feedback conditions. However, the staff repeatedly found a difference between the two, with the staff in the RC conditions reporting more-favorable outcomes for their participants than the staff in the NC condition.

White et al. (2013) examined the feasibility and initial outcomes of the Multimodal Anxiety and Social Skills Intervention (MASSI) for adolescents with ASD. They utilized an independent group design with participants assigned in a randomized fashion to either a treatment group or control group. The MASSI program used cognitive behavioral therapy (CBT) to address both anxiety and social skill deficits in the participants. The program had three main components: individual therapy, group social skills instruction, and parent coaching and education. The participants in the treatment condition received 12–13 individual sessions (60–70 minutes each) and seven group sessions (75 minutes each). The parents participated in the last 15 min of each of the individual treatment session. The group social skills training sessions were comprised of three individuals with ASD and one typically developing peer. The intervention lasted 14 weeks. Findings suggested that there were statistically significant changes in social competence from preintervention to postintervention on the *Social Responsiveness Scale* (SRS). The results also suggest that MASSI is a feasible intervention acceptable to parents and participants.

Lee et al. (2009) evaluated the effectiveness of a social cognitive intervention on improving the areas discussed in Winner's I-LAUGH model (i.e., initiation, listening, abstracting, understanding perspectives, gestalt, and humor) for four individuals with autism based on Winner's Social Thinking® approach. The researchers used a mixed-method design that included a pretest and posttest design and a qualitative design. They referenced two of Winner's books, *Thinking About You Thinking About Me* (2002) and *Think Social* (2005), in developing the framework for their intervention. The study involved eight 1.5-hr group sessions and consisted of role plays, discussion, watching videos, games, and worksheets. The participants and their parents were given homework.

The study included quantitative and qualitative assessments. Findings suggested that all of the participants showed some level of improvement on the *Social Thinking Rating Scale* (STRS) postintervention; however, the amount of improvement was relatively small (i.e., ranging from 0.88% to 7.54%). In terms of the qualitative measures, all of the parents and participants reported improvements. Lee et al. identified several themes that emerged from the interviews: thinking and talking, interaction and others, and relationships. The participants discussed learning how to think and reported an increase in their conversational skills. They also noted a reduction in their irrelevant speech, having a better awareness of body language, and using their eyes to look at people. In terms of the "interaction and others" theme, the participants and parents noted improvements in the participants' social interaction skills and their level of attentiveness toward others. In reference to the final theme identified, relationships, improvements were reported in the participants' relationships with other people. Overall, Lee et al.'s (2009) study is promising and was the first study with adolescents to show the potential of using an intervention based on Winner's work. Further research into Winner's work is warranted.

Lee et al. (2015) evaluated the effectiveness of a social cognitive intervention on improving the areas discussed in Winner's I-LAUGH model (i.e., initiation, listening, abstracting, understanding perspectives, gestalt, and humor) for 39 individuals with ASD and other social communication difficulties. The researchers used a pretest and posttest design. They referenced two of Winner's books, *Thinking About You Thinking About Me* (2002) and *Think Social* (2005), to develop the framework for their intervention. The study involved 12 weekly 1.5-hr group sessions and consisted of role plays, watching videos, games, and worksheets.

The study utilized the *Social Thinking-ILAUGH Scale* based on a clinical questionnaire used at the Social Thinking Center. Parents, teachers, and other professionals who were familiar with the students were asked to complete the questionnaire preintervention and postintervention. Findings showed significant improvement in five aspects of ILAUGH concepts, with no significant improvement in humor postintervention. Overall, Lee et al.'s (2009) study continued the research from their previous study, and it remains promising.

Research Designs of the Research Reviewed

One-Group, Pretest-Posttest Design. Many studies employed a one-group, pretest-posttest design. A one-group, pretest-posttest design has three basic components: a pretest, an intervention, and then a posttest (Cozby, 2009). There is only one group, the treatment group; there is not a control group or an alternative treatment group. However, there are some studies in which the number of participants is so large that the number of participants is split into several groups; each receiving the same treatment. Nevertheless, it is still considered a one-group pretest-posttest design. A one-group pretest-posttest design is considered quasi-experimental because there is not a control group and there is no random assignment of the participants (Cozby, 2009). For a study to be considered a true experiment, it must have a control group and random assignment of the participants (Cozby, 2009).

A one-group, pretest-posttest design is a weak design because it does not control for threats to internal validity (Cozby, 2009). It does not account for history, maturation, testing, instrument decay, or regression toward the mean (Cozby, 2009). The term history refers to any event that occurs during an intervention (i.e., the time between the preassessment and postassessment) that was not part of the intervention. Such an event could account for changes in the dependent variable, which could make it a threat to internal validity.

According to Cozby (2009), maturation has to do with changes that occur with an individual due to time (e.g., development, fatigue). The change that is seen in the dependent variable could be due to time versus the intervention. Testing is a threat to internal validity when the taking of the pretest changes a participant's behavior (Cozby, 2009). Additionally, taking the pretest can make the participant more aware of the purpose of the experiment, which would make the participant more sensitive to the intervention or more proficient in the skills (Cozby, 2009). All of those scenarios are a threat to internal validity. Instrument decay is when the instrument that measures the dependent variable changes over time (Cozby, 2009). That is especially problematic when the instrument involves people who are more subject to change. For instance, if an individual observes the dependent variable, over time the participant could become more skilled in their observation and collecting data, which would ultimately affect the data. Additionally, the participant might also become fatigued, which could impact the accuracy of data collection. The other threat to internal validity that Cozby (2009) discussed is regression toward the mean. This is a statistical regression and occurs when scores are used that are either especially high or especially low compared to the mean score. Over time, extremely high scores would become lower, and extremely low scores would become higher. Regression toward a mean is ultimately related to the reliability of the measurement and the inevitable measurement error that occurs (Cozby, 2009).

In all of the studies I reviewed that employed a one-group, pretest-posttest design, there was no way to causally link the intervention to the results that were seen. All of the studies reported improvement in the participants' social skills and implied that the improvement was due to the intervention. However, with such a research design, it is impossible to conclude any sort of causal claims related to the intervention.

The strength of a one-group, pretest-posttest design is that it can be performed with fewer participants. It also can be carried out in a shorter time period and is less expensive because it employs only one group. When there is a control group or alternative treatment group, a researcher must collect data on both the treatment group and the control group, which can double the time and expense. Employing an alternate treatment group adds time and expense because a second group receives some form of intervention. Additionally, there is not an ethical dilemma of withholding a potentially effective treatment from a group (e.g., the control group) that could benefit from the treatment. In studies that have a control group and the intervention is found to be effective, the intervention is offered to the control group at the conclusion of the study, which also adds time and expense to the study. The major limitation of the one-group, pretest-posttest design is that it is weak and causal arguments cannot be made. Any positive outcomes cannot be directly attributed to the intervention because of the threats to internal validity that were not accounted for in this design. In my opinion, the weakness of this design far outweighs its strength. Nevertheless, it is interesting to note that the majority (69%) of the group design studies I reviewed used this design.

Nonequivalent Control Group Pretest-Posttest Design. Three studies employed nonequivalent control group pretest-posttest designs (Golan & Baron-Cohen, 2006; Ozonoff & Miller 1995; Turner-Brown et al., 2008). Nonequivalent control group pretest-posttest designs are group designs that employ two groups: a treatment group and a control or alternative treatment group (Cozby, 2009). Assessments are taken preintervention and postintervention. It is a quasi-experimental design because there is no random assignment of the participants into the groups. Cozby (2009) found that this was the most useful quasi-experimental design.

In the nonequivalent control group pretest-posttest design, the two groups (i.e., treatment group and the control group or alternative treatment group) cannot be considered the same or equivalent because random assignment was not used (Cozby, 2009). Because the two groups were different, any difference in the outcomes of the two groups could be attributed to preexisting differences of the two groups. However, steps can be taken to minimize the problem of the groups being different. Pretest scores of each group could be compared to determine any similarities of the groups. If the pretest scores of the two groups are the same or similar, an argument could be made that the difference in outcomes was more likely due to the intervention than to preexisting differences. Additionally, the differences between the pretest and posttest scores in both groups could be compared. If the treatment group had a larger difference between pretest and posttest scores than the control group, an argument could be made that the difference was likely due to the intervention.

The nonequivalent control group pretest-posttest design is far superior to the one-group, pretest-posttest design. The control group in the nonequivalent control group pretest-posttest design accounts for many of the threats to internal validity. Therefore, there is stronger internal validity in this design, and stronger causal arguments can be made. The outcomes could more likely be attributed to the intervention than to other factors.

All three studies that employed the nonequivalent control group pretest-posttest design reported positive outcomes. Those outcomes were more likely due to the intervention than to other factors. Nevertheless, it is still possible that because the groups were different, the differences could account for some of the positive outcomes. Yet the authors of the three studies made an argument that the groups were similar, despite the lack of randomization.

Therefore, a strong causal claim can be made, though it would not be as strong as if the participants had been randomly assigned.

The strength of this design is that is has strong internal validity and that causal arguments can be made. The differences in the dependent variable can be directly related to the independent variable. Ultimately, that is one of the primary purposes of the studies, to show that the intervention is responsible for the positive outcomes. If outcomes cannot be attributed directly to an independent variable and if causal arguments cannot be made, then what is the point of conducting the study?

Despite the overwhelmingly positive strength of the nonequivalent control group pretest-posttest design, it has limitations. Ideally, a study should have the same number of participants in the treatment group and in the control or alternative treatment group. A large number of participants are required to conduct many statistical analyses (e.g., ANOVA). In addition to requiring more participants, this design requires more time and money when compared to the one group, pretest-posttest design. It also will take more time to recruit the additional participants needed. Because there are two groups, there will be twice as many preassessments and postassessments, which could double the time and expense required to complete the research. If there is an alternative treatment group, versus a control group, more time would be necessary because two groups must receive treatment. Another limitation is the ethical concern of withholding a potentially effective treatment from the control group. Often, researchers will account for this ethical concern by offering the intervention to the control group after the study is completed. Yet again, that adds to the time and expense of the study. Lastly, another limitations or difficulty is that researchers might have difficulties recruiting two groups that are similar. While the groups are not the same (since there is not

random assignment), researchers want the two groups to be as similar as possible. This can be difficult with individuals with ASD because of the diversity of symptomology in those diagnosed with ASD. There is a common saying in the field: “If you have met one person with autism, you have met one person with autism.” In other words, no two individuals with ASD are alike, and the strengths and weakness of the individuals can vary greatly. For instance, 10 high-functioning individuals with ASD are verbal and have similar IQ scores, but their social skill deficits can be vastly different. Some of the 10 might have difficulty initiating a conversation while others might have difficulty engaging in appropriate conversational topics.

Counterbalanced Repeated-Measure Group Design. Mitchell et al. (2007) used a counterbalanced repeated-measure group design. In a repeated-measure design (aka, Within-subjects design), all participants are assigned to each condition or treatment (Cozby, 2009). With counterbalancing, the participants receive the treatments in different orders, which helps to control for order effects. Cozby (2009) described three types of order effects: practice effect, fatigue effect, and contrast effect. In practice effect, a participant’s performance improves because of repeated practice. With fatigue effect, a participant’s performance decreases due to boredom, fatigue, or distraction. Cozby (2009) described contrast effect as when the effect of one treatment carries over and influences a response during the next treatment. Order effects are problematic because they decrease the internal validity of a study; the change in the dependent variable can be due to other confounding variables instead of just the independent variable.

With counterbalancing, an assumption is made that the carry-over effect in one direction cancels the effects of carry-over in another direction (Cozby, 2009). However, it is

possible that the carry-over effects occur only in one direction, which would limit the effectiveness of the counterbalancing. In a complete counterbalancing design, all of the possible orders of the treatments are included in the study. For instance, if there are two treatments, A and B, as was the case in Mitchell et al.'s (2007) study, there would be two combinations (i.e., AB and BA). When there are two treatments, a complete counterbalancing design is easy to do. In Mitchell et al.'s (2007) study, only two treatments were used, and thus, it was a complete counterbalancing design. The study did not employ random assignment and thus was considered a quasi-experiment. However, many counterbalanced repeated-measure designs use random assignment, and that would make the study a true experiment (Cozby, 2009).

Repeated-measure designs have several strengths. One is that fewer participants are required because each participant is involved in all conditions (Cozby, 2009). As a result of needing a smaller number of participants, such a study likely would be less expensive and less time consuming than designs requiring a larger number of participants. Less time would be spent finding research participants and collecting initial assessments. Another strength of repeated- measure design is that there is no need to match the treatment group with a control group because they are one and the same; the individual acts as their own control. That is beneficial when there are large individual differences, as is the case in individuals with ASD. Cozby (2009) also highlighted the fact that repeated-measure designs are sensitive to finding statistically significant differences between the treatment conditions. Effects of the independent variable are easily seen.

One of the major limitations of a repeated-measure design is the order effects, which counterbalancing helps to control for. Yet by introducing additional variables, complications

can arise in controlling the order effects. More complicated research designs are required. Additionally, there are some independent variables for which a repeated-measure design does not work. For instance, if an intervention cures or produces a relatively permanent change, then a repeated-measure design would not be suitable (Cozby, 2009).

There were several additional findings from this review of research. First, in the majority of the studies, the participants had difficulties in generalizing the learned skill to real life. The participants were able to increase their social knowledge but they had a hard time applying the knowledge in natural settings. Some of the studies reported generalization occurring, yet upon closer observation, it was evident that the generalization was limited (e.g., from a familiar room to an unfamiliar room). In another study, Morrison et al. (2001) found some demonstration of the learned skill in generalization probes, but it could not be clearly linked to the intervention. In only five studies were the results truly generalized to more natural settings, and in those studies, the majority of the intervention occurred in a natural setting (Gaylord et al. 1984; Haring & Breen, 1992; Hughes et al., 1996; Hughes et al., 2011; Scattone et al., 2006). Second, in several of the studies, many of the parents and participants wanted the intervention to continue even though no changes in social skills were observed. The primary difference between preintervention and postintervention was that friendships were developed and the participants had opportunities to socialize. Several possible reasons can be cited for why families and participants wanted the intervention to continue: developing friendships and having opportunities to socialize are valuable outcomes to parents and participants; participants have limited opportunities to socialize in their day-to-day lives and are excited about social opportunities presented; and/or a lack of social skills

instruction is provided, and therefore, parents and participants are likely to seize any opportunity to improve these skills, regardless of the quality of the instruction.

The most promising studies were ones in which the majority of the intervention took place in a natural setting. More research needs to be done that includes all of the demographic information recommended by the Committee on Educational Interventions for Children with Autism. Additional research should include interventions that take place in natural settings and that include follow-up for maintenance and generalization to other settings.

Social Thinking Research

Seven studies in the literature pertained specifically to Winner's Social Thinking®. Two of them met the criteria to be included in the literature review (i.e., Lee et al., 2009; Lee et al., 2015) that was discussed in the previous section. The remaining studies were Crooke et al.'s (2008) brief report, Miller's (2004) master's thesis, and three doctoral dissertations. The results of the Social Thinking® research will be discussed.

Crooke et al.'s (2008) brief report was on a larger multiple baseline design study that looked at the effectiveness of a social cognitive intervention (i.e., Social Thinking®) in children aged 9 to 11 who had Asperger's and high functioning autism. Crooke et al.'s (2008) brief report used direct observation to calculate the number of expected and unexpected behaviors (i.e., five verbal and nonverbal behaviors). The intervention consisted of 60-minute weekly instruction for 8 weeks and included direct instruction on social thinking concepts followed by practice and unstructured time (i.e., snack, discussions). The preliminary results were promising, in that the individuals showed statistically significant gains following treatment. Another strength of the research was that direct observation was

used, versus relying on questionnaires. Yet a drawback was that only the brief report was published, and the full results were never published.

Miller's (2004) master thesis looked at one of the assessments developed by Winner to evaluate the social communication skills of individuals with ASD (i.e., the double interview task). Miller's research found that children with Asperger's syndrome performed differently from typically developing peers on Winner's double interview task. Miller's work points to the potential of the double interview task of helping to identify individuals with Asperger's syndrome.

Curtis's (2021) doctoral dissertation was a qualitative descriptive study on cognitive-based behavioral approaches for students with ASD. The study examined how interventionists used cognitive behavioral approaches, one of which was Social Thinking®. While this was a qualitative research study and the current study was quantitative, this study was reviewed to highlight how more researchers are now assessing Social Thinking®.

Clavenna-Deane's (2010) doctoral dissertation used a multiple baseline across skills design to assess the effectiveness of a cognitive-behavioral social communication intervention for individuals with ASD. The intervention consisted of SBM, conversation supportive language, role plays with peer models, and review and feedback. The purpose was to determine if the intervention improved the social reciprocity and employment experiences of adolescents with high functioning ASD. Observational data, using interval time sampling, were collected on conversations between coworkers and participants. Weekly employer raters were used to assess the participants' weekly employability and social skills. Some improvement in the use of supportive comments and follow-up questions was reported. There were no significant findings for bridging comments or questions. Social validity from the

participants, teachers, job coaches, and employers supported the usefulness of the intervention.

Taylor's (2011) doctoral dissertation used a mixed-method study to evaluate the effectiveness of Social Thinking® with three adolescent boys with Asperger's. The purpose was to determine if Social Thinking® resulted in building social cognitive skills, if improving social cognition resulted in an increase in social responsiveness, and if Social Thinking® resulted in a demonstration of the skills in familiar and novel environments. The social responsiveness scale (SRS) was used to evaluate skills preintervention and postintervention along with direct observation. A single-subject multiple baseline design with repeated measures was used to measure change in social responsiveness. Taylor reported an improvement on SRS scores based on mean score changes and an increase in social cognition.

Of the Social Thinking® studies found, five of the seven evaluated the intervention components of the Social Thinking® approach. One assessed the effectiveness of Winner's informal assessments she developed for assessing participants' social thinking and the presence of characteristics of ASD. Of the five intervention studies, one involved children and the others included adolescents. All of the studies reported some level of improvement in the participants following completion of the intervention, which is encouraging and supports the need for further research.

Discussion

This review of research literature sought to answer the following question: What research has been done that evaluated the effectiveness of social-communication skills interventions for adolescents with ASD. Some research on that issue has been done, as

evidenced by the 39 articles I found. However, significant limitations in that research are evident, and thus, further research is warranted.

In terms of reporting participant characteristics, all studies reported the following: gender, age, and diagnoses. Only 18 studies reported IQ scores, and very few reported the ethnicity of the participants. Only one study (i.e., Scattone et al., 2006) mentioned the participants' socioeconomic status. That is another considerable limitation as the Committee on Educational Interventions for Children with Autism recommends that all intervention studies relating to ASD include the following demographic information on the participants who choose to participate and those who choose not to participate: "chronological age, developmental assessment data (including verbal and nonverbal IQ levels), standardized diagnoses, gender, race, family characteristics, socioeconomic status, and relevant heath or other biological impairments" (National Research Council, 2001, p. 228). None of the studies in this review of research met those criteria.

All of the interventions occurred in highly structured settings (e.g., self-contained classrooms, clinics, decontextualized situations). Only 12 of the studies included practice of the learned skill in a natural setting, and the length of time spent in a natural setting varied among the studies. In only five studies did the majority of the instruction take place in a natural setting (i.e., during passing periods and lunch). The lack of studies that incorporated interventions occurring in natural settings is alarming because a primary characteristic of ASD is its difficulty with generalization. The very nature of ASD necessitates that interventions occur in natural settings whenever possible.

In terms of outcome measures, there was a heavy reliance on questionnaires in the group designs that assessed the perceptions of participants, parents, and/or teachers. The

questionnaires, while informative, provided subjective information because the individuals completing them often are biased, and they have a vested interested in the participant showing improvement, which is likely to affect results. In the group studies when direct observations occurred, it was often limited and consisted primarily of observing the learned skill in a decontextualized setting (e.g., role plays, clinic).

In the group studies included in the review, there are serious threats to external validity or the ability to generalize the findings to other people, places, and situations. According to Cozby (2009), there are two primary types of generalizability: population generalizability and ecological generalizability. Population generalizability is related to the degree to which the sample in the study is representative of the target population. In the group studies reviewed, all of the researchers used convenience sampling. In convenience sampling, a sample is chosen based on what is feasible for the researcher to measure. Because it is not a random, purposeful, or systematic sample, the sample of participants is less likely to be representative of the target population. That decreases the external validity of the study as it relates to population generalizability. Ecological generalizability relates to the ability to generalize findings to conditions not included in the study. The more the settings and conditions in the study represent real-life situations, the more likely the findings will generalize to other real-life settings (Cozby, 2009). All of the studies occurred in highly structured settings, with only a few including practice of the learned skill in a natural setting. That limits the external validity of the studies in terms of ecological generalizability.

Summary of Chapter 2

There is a limited amount of research pertaining to social skill instruction in adolescents with ASD. All of the studies reported improvement in the targeted skills, but the

majority of the improvement occurred in structured settings and decontextualized situations (e.g., role plays). Very few studies assessed for the generalization of the learned skills to natural settings. That raises the question of the effectiveness of the interventions in natural settings. The skills may in fact be generalizing to natural settings, but this is unknown because very few studies assessed this. More interventions are needed to purposefully plan for generalization because many individuals with ASD do not automatically generalize learned skills.

The research on Social Thinking®, while promising, is still limited. It is still an emerging intervention and lacks sufficient research to be considered an evidenced-based practice. I hope to add to the current body of research on Social Thinking® and make a positive contribution to social skills literature. It is evident that more research on Social Thinking® is needed. The present study can potentially add to the current body of research on Social Thinking® and on social skills interventions as a whole.

Chapter 3

Methods

Chapter 3 provides a brief overview of the intervention used in this study, followed by the purpose of the study and the specific research questions. The participants and setting are described along with the research design used in this study. The procedures including recruitment, obtaining consent and assessment, measures, and data analysis are discussed in detail.

Purpose of the Study

The purposes of the study were to evaluate the effectiveness of the SBM intervention in increasing participants' observed ability to identify components of the social emotional chain reaction when given a social context, to examine whether participants' overall social skills improved, and to evaluate whether there was observable increase of participants' expected social behaviors and a decrease of participants' unexpected social behavior as a result of SBM.

Specific Research Questions

- Does the SBM intervention increase participants' observed ability to identify the components of the social emotional chain reaction (i.e., identifying the expected and unexpected behaviors of a given social context, the associated emotions of others, anticipated consequences, and the participants' emotional response) measured by completing social behavior maps (preintervention and postintervention) by the participants?
- Does the SBM intervention result in an improvement of social skills as reported by participants and parents on the Social Skills Subscale of the SSIS?

- Does the SBM intervention increase the number of participants' observed expected behaviors and decrease the number of participants' observed unexpected behaviors?

Participants

Participants were recruited from a metropolitan city in the southwest part of the United States. To be included in the study, participants were required to be between the ages of 13 and 17 and to have a verbal IQ of 70 or above because this is what Winner (2007) recommended when using a Social Thinking® approach. Participants were excluded if they did not have an ASD diagnosis or a verbal IQ below 70. Having a dual diagnosis or multiple diagnoses did not exclude participation in the study because many individuals with ASD have multiple diagnoses. The principal investigator (PI) recruited 23 individuals. Twenty two of them remained for the duration of the study and were included in the data analysis**.** The characteristics of the participants for the two groups are detailed in Table 3.

Settings

Preassessments and postassessments and the intervention occurred in the PI's multidisciplinary clinic (i.e., speech-language therapy, occupational therapy, social skills groups, comprehensive evaluations). The therapy clinic is located in a metropolitan city in the southwest part of the United States. The clinic was approximately 3,000 square feet and consisted of a waiting room, two offices, three therapy rooms, a sensory gym, and a larger therapy room that had a small kitchen. The intervention took place in the larger therapy room with the small kitchen. The larger therapy room contained one table with chairs, a refrigerator, a sink, and a small oven with an overhead microwave.

Research Design

The study employed a pretest-posttest control group design with matched sampling. The participants were matched on full scale IQ scores and age. Once the participants were grouped into matching pairs, each was randomly assigned to either the intervention (n = 12) or the treatment as usual (n = 11) condition. The study used a true experimental design, which controlled for all threats to internal validity (i.e., history, maturation, testing, instrumentation, regression, selection, mortality, and selection interactions) and the multiple interference for external validity (Gay et al., 2012). Random assignment was used to control for extraneous variables. Participants who were randomly assigned to the intervention group did activities (i.e., snacks and games) along with the SBM intervention. Participants who were randomly assigned to the treatment as usual group participated in the same activities/games and snack time as the intervention group but did not receive the additional instruction in SBM.

The participants and their families were not informed of their condition assignment (intervention or treatment as usual condition). Once the participants were randomly assigned to each condition, they were divided up into smaller groups ranging from two to five participants each. The families were given several options of potential times to meet, because the PI worked around the family schedule to determine times that were most convenient to meet. There were a total of six groups: three intervention groups and three treatment as usual groups. The make-up of the three intervention groups was as follows: one with two participants and two with five participants. The make-up of the three treatment as usual groups was as follows: one with two participants, one with four participants, and one with

five participants. It was necessary to divide the participants up into smaller groups because the intervention was designed for small-group implementation.

Procedure

Recruitment

The PI submitted the Institutional Review Board (IRB) application to the University of New Mexico in November 2021. After approval by the IRB, the PI sent flyers about the study to local therapy agencies (i.e., speech, occupational, physical, and behavioral) and case management agencies. The PI also contacted the New Mexico Autism Society and the Center for Developmental Disabilities regarding recruiting participants for the study along with advertising on the local ASD agencies' listserv. The PI also recruited participants who met inclusion criteria from the PI's clinic and individuals waiting to be evaluated at the PI's diagnostic clinic. Interested parties contacted the PI.

Obtaining Consent and Assent

If parents were interested in having their child participate in the study, the PI talked with the parents on the phone, via email, and in person to answer questions regarding this study and to describe the purpose of the study. If a child appeared to meet the inclusion criteria (e.g., age, diagnosis, and intellectual ability), the PI met with the parents and the child. The PI asked them to bring any documentation pertaining to the child's ASD diagnosis, IQ scores, and the child's current functioning status (e.g., neuropsychological evaluation, educational reports, reports from any therapists, etc.). The PI reviewed the documentation to verify that the child met the inclusion criteria. If any documentation was missing but the participant appeared to meet inclusion criteria from parent report/case history, the PI completed necessary assessments to confirm inclusion criteria were met. For

instance, if the individual did not have any IQ testing, the PI administered the *Wechsler Abbreviated Scale of Intelligence-Second Edition* (WASI-II) to each child individually in the clinic to determine whether they met the inclusion criteria for the study. If there was a question about a child's ASD diagnosis, the PI administered the ADOS-2 to assess for characteristics of ASD and to determine if the child met diagnostic criteria for ASD. If the child met the inclusion criteria, the PI explained the research study and answered any questions the parents and individual had. The PI presented the informed consent and assent paperwork to potential participants and their parents. The PI gave the parents and the participants a week to decide whether they wanted to participate in the study. When the parents decided they wanted their child to participate, they signed a consent form and returned it to the PI. Participants who decided to participate were asked to sign an assent form. Consent and assent forms were obtained from each participant and parent prior to completing preassessment steps and starting the intervention.

Preassessment

During preassessment, parents completed a demographic questionnaire and the SSIS. The PI or a trained clinician administered the *Clinical Evaluation of Language Fundamentals-Fifth Edition Screener* (CELF-5) to each participant. If the child did not meet passing criteria as outlined in the CELF-5 manual, a core subtest of the CELF-5 was administered. The CELF-5 screener and CELF-5 provided information on the child's language abilities and were used for descriptive purposes only. The participants completed three blank SBM forms with the following social contexts (i.e., eating snacks with peers with an adult present, participating in games/activities with peers with an adult present, and

attending a party with peers and parents). In addition, participants were asked to complete the SSIS.

Intervention

After preassessments were completed, an 8-week intervention was implemented. The intervention consisted of a weekly one-hour session for 8 consecutive weeks. A breakdown of the intervention week by week is provided in Appendix A. The group sessions, regardless of whether it was the intervention or treatment as usual group, had a similar format: a 5-min check-in, snack, game/activity, and a 5-min wrap-up. The intervention group had one additional component, the SBM instruction. The ten steps of SBM are listed in Appendix B and a sample social behavior map is provided in Appendix C. The direct instruction occurred right after check-in and was followed by snack. The intervention group had a reduction of time in both the snack and game/activity components of the intervention to allow time for direct instruction on SBM.

Snacks and participating in games and/or activities were chosen for the social groups because they were social activities that adolescents were likely to participate in. The PI attempted to create social situations within the social groups that were as natural as possible to aid in generalization. Both groups were provided with a variety of snacks, games, and activities to choose from. All of the groups, regardless of the condition, were provided with the same set of choices. However, there was some variance in snacks, games and/or activities based on the interests of the participants. For instance, some of the groups chose to play games while others chose to participate in art activities. Choice was implemented into the sessions in order to keep the participants interested and engaged throughout the 8 weeks.

During the first group meeting, the first 10 min of the snack time and the first 10 min of the game/activity were videotaped and later coded for expected and unexpected behaviors. No direct instruction or SBM intervention occurred, as it was used for baseline measures. From the 2nd week to the 7th week of the study, participants in the intervention group received 20 min of direct instruction on SBM.

The participants in the treatment as usual group met and participated in the same social contexts (i.e., snack and games/activities) as the intervention group but did not receive instruction on SBM. They had more time for snacks and games/activities. No prompting or feedback was given, and the PI acted as a neutral facilitator for the treatment as usual group.

Postassessment

During the 8th week of the intervention sessions, postassessment observation data were collected. Parents and participants were asked to complete the SSIS, and participants were also asked to fill out three SBMs, with the same social contexts as in preassessment. The group met for postassessment observation, and the same format was followed as during the baseline observation; the first 10 min of the games/activities session and the first 10 min of snack time were videotaped and later coded for expected and unexpected behaviors. No intervention or instruction was provided to the participants; they participated in the games/activities and snack time.

Generalization

Once postassessments were completed, one final session occurred the following week for generalization measures. The participants met for a celebration party. For the party, the participants, their parents, and the PI met in the large therapy room for a dinner, followed by free time in the sensory gym. Two 10-minute segments of the party (i.e., the first 10 min of

the meal and the first 10 min of the time in the sensory gym) were videotaped and coded for expected and unexpected behaviors. While the party was held at the same physical address, the social context was different (i.e., social party with peers and parents), and a new setting within the clinic was introduced (i.e., the sensory gym).

To measure treatment fidelity of the sessions where direct instruction on SBM occurred, 20% of the intervention sessions were observed by a licensed speech language pathologist familiar with SBM. A checklist was provided to measure treatment fidelity (see Appendix E). For the observational data, 20% of the videotaped sessions were independently rated to determine interobserver agreement. Interobserver agreement is established by taking the sum of the agreements divided by the sum of agreements and disagreements.

Social Behavior Mapping Intervention

SBM is a component of Winner's Social Thinking® approach (Winner, 2007). It increases a participant's awareness of the social context around them and helps them to identify the hidden social rules. It provides a framework for understanding and visualizing the social emotional chain reaction and the effect one's behavior has on those around them. SBM consists of priming the individual to what they are about to learn and following 10 specific steps to complete the social behavior map. It is important to note that SBM is initially used as a framework for social observation in which the individual observes others. It then progresses to focusing on the individual's own behavior and increasing their awareness on how their behavior affects others. Once the social behavior map is completed, it can be used as a self-monitoring tool and an overall visual reminder of the social emotional chain reaction. SBM is not a behavioral change mechanism; rather, it focuses on teaching the underlying social concepts (i.e., social observation, understanding emotional responses of

others and ultimately one's self, and the natural social consequences for one's social behavior). A change in a participant's behavior often occurs as they become more aware of their own behaviors and how they affect those around them.

The SBM intervention was implemented by the PI, who has a Master's of Science degree in speech and hearing sciences and is a licensed speech-language pathologist. The PI has successfully completed the Social Thinking Clinical Training Level 1 Assessment, which involved 22 hours of training and observation from the Social Thinking staff at Social Thinking clinics in California. The PI has more than 14 years of experience working with individuals with ASD.

The SBM intervention was used to help the participants become more aware of the social situation around them and to observe other's behavior. The SBM intervention consisted of priming and completion of 10 steps. Priming involved introducing the social behavior map through a simple statement: "This is a sort of road map that shows what people do and how others might think, feel, and respond. It is called a social behavior map."

Step 1 consisted of defining the situation and the people. The PI initially defined the situation and the people involved, and later the participants were involved in generating situations and people.

Step 2 involved asking the participant to identify unexpected behaviors for the given situation. Some written tips were included on the social behavior map to assist the participant in coming up with behaviors. After the participant identified the unexpected behavior, the PI reiterated and described the behavior in a brief and instructive manner. The PI rephrased as necessary.

Step 3 consisted of having the participants identify expected behaviors for the situation. The tips were once again referenced as needed.

Step 4 involved moving across the map (i.e., the expected portion) to identify how others feel when someone demonstrates expected behaviors. For instance, the following verbiage was suggested: “When (situation) with (people), if someone (expected 1, 2, 3, and 4), then how might others feel (or think)?” The participant identified the emotional response of others.

Step 5 continued with the social emotional chain reaction and had the participant predict the actions or reactions of others. The PI restated the emotions provided by the participant and asked the participant how others likely would react when feeling that way.

Step 6 concluded the social emotional chain reaction and bought it back to how the individual who demonstrated the expected behaviors would feel based on the reaction/action of others.

Steps 7 through 9 involved following the same steps as listed above, but for the unexpected portion of the map.

In Step 10, after the expected and unexpected portions of the social behavior map were completed, the PI circled the chain reaction while talking through the map.

The intervention sessions followed a similar format each time. The session started with a brief check-in to determine how each participant was doing. This initial check-in was followed by a 20-min instructional period on SBM. The instructional period consisted of going over the components of the social behavior map and underlying social concepts (i.e., what defines a social situation, obvious and hidden social rules, expected and unexpected behaviors, people have thoughts/feelings/reactions about our behaviors, we can make choices

about what we do and don't do which ultimately affects how we feel and how others treat us). Dr. Pamela Crooke and Michelle Garcia Winner's book (2011), Social Fortune / Social Fate, was used to introduce these concepts and provide examples of social behavior maps. This book was specifically designed to teach SBM to adolescents. It presented the concepts through a graphic novel format.

As the intervention progressed and participants learned the foundational components of the social behavior map, the intervention shifted to applying the social behavior maps to the participants' own behavior and specific contexts of the intervention. At this stage of the intervention, the participants completed the social behavior maps for both contexts: participating in games/activities with peers with an adult present and eating snacks with peers with an adult present over several sessions. Once completed, the components of the social behavior maps were reviewed prior to the two contexts described above.

Following the instruction, the participants were given several snacks to choose from. After the snack time was completed, the participants chose either a game or activity to do as a group. As mentioned previously, the social behavior map was reviewed prior to the snack time and activity/game. The final 5 min of the session were devoted to wrapping up.

Group activities/games and snacks were included to incorporate functional and real-life scenarios for the participants to observe and to practice concepts being discussed. The participants were given a set of games and activities to choose from that were age-appropriate and high interest. The focus was not so much on the activity but on the socialization and interaction that occurred while participating in the activity. The games and activities provided the context for which to develop and practice skills targeted in the social behavior maps.

In the treatment as usual condition, the participants had an initial check-in and participated in snacks and activities/games just like the intervention group did. They did not receive the direct instruction and spent longer in the snack and activities/games component of the intervention.

Measures

Demographic Questionnaire

The demographic questionnaire gathered the following information from the participants, as recommended by the Committee on Educational Interventions for Children with Autism: age, gender, diagnoses, race, family characteristics, socio-economic status, and relevant health or other biological impairments (see Appendix H).

IQ

The Wechsler Abbreviated Scale of Intelligence-Second Edition (WASI-II; Wechsler, 2011) is a revision of the Wechsler Abbreviated Scale of Intelligence (WASI). It provided a reliable measure of cognitive ability but had a shorter administration time than the full versions for adults and children. It was appropriate for the purposes of this study, which was not intended to provide a detailed cognitive evaluation but rather to determine if an individual met the inclusion criteria to be a participant in the study. It reports two composite scores: Verbal Comprehension Index (VCI) and Perceptual Reasoning Index (PRI). The VCI and PRI are replacement terms for what previously was reported as Verbal IQ (VIQ) and Performance IQ (PIQ). The PI administered the items necessary to obtain a VCI score when the participant had not had cognitive testing.

Language

The Clinical Evaluation of Language Fundamentals□Fifth Edition Screener (CELF□5; Wigg et al., 2013) was administered individually to each participant by the PI or trained clinician. The CELF-5 Screening Test was used to determine whether a participant needed further evaluation and might have a language disorder. It took approximately 15 minutes to administer. If the participant did not meet passing criteria, the core subtests of the CELF-5 Test were given. The CELF□5 Screening Test and CELF-5 are a widely used, norm□referenced language tests (M = 100, Standard Deviation = 15). They were used to describe the participants' language abilities which are described in Table 3.

Social Skills

Social Skills Improvement System Rating Scales (SSIS; Gresham & Elliot, 2008) provides a comprehensive assessment of an individual's social skills, problem behaviors, and academic competence. It is a revision of the SSRS, and both the SSRS and SSIS have been widely used in social skills research. Only the social skills subscale scores were used in this study. The social skills subscale measures communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. Parents, teachers, and individuals can use this assessment. For the purposes of this study, the parents and participants were asked to complete it.

Social Behavior Map. Three social behavior maps were completed by participants preintervention and postintervention. The social behavior maps had three social situations: eating snacks with peers with an adult present, participating in games/activities with peers with an adult present, and attending a party with peers and adults. A rubric was used to score the accuracy and quality of their answers on the four main components of the social behavior

maps: expected and unexpected behaviors, how the answers make others feel, consequences you experience, how you feel about yourself (see Appendix D).

Observations. The frequency of expected and unexpected behaviors for each participant was coded during videotaped preintervention and postintervention sessions and the generalization session (see Appendix F & G). Two primary social contexts occurred during each social group for the duration of the study: snack and game/activity. For the purposes of generalization, the snack observation was changed to dinner, and the activity/game observation was changed to time in the sensory gym, which the participants had not visited previously. Ten min of each social context was video recorded at three separate times throughout the study: during preintervention, postintervention, and generalization. A total of 30 min of observational data were collected for snack/dinner and 30 min of observational data for activities/games/sensory gym for each participant. Each participant had a total of 60 min of observation (i.e., 30 min for snack/dinner and 30 min for activity/games/sensory gym).

Social Validity

A social validity questionnaire was completed at the end of the study during postassessment measures (see Appendix I and Appendix J). This was completed by both the participants and a primary caregiver.

Data Analysis Plan

The data were analyzed using IBM SPSS Statistics (Version 27). Descriptive analyses were expressed as means and standard deviations for each key variable during preassessments and postassessments. An independent *t*-test was conducted for the prehomogeneity of dependent variables (student-reported SSIS and parent-reported SSIS,

SBM, and observed measures) between the intervention and treatment as usual groups. To ascertain the effectiveness of the SBM intervention on the participants' social skills outcomes between intervention group and treatment as usual group (student-reported and parent-reported SSIS Social Skills subscale standard scores, social behavior mapping rating scale scores, and observational measures) from preassessment to postassessment, a two-way repeated measures analysis of variance (ANOVAs) was conducted. The two-way repeated measures ANOVA determined whether any changes in the social skills outcomes (i.e., dependent variables) were the result of the interaction between the "condition" (i.e., intervention or treatment as usual) and "time" (i.e., preassessment and postassessment) with group as a between-subjects factor and time as a within-subjects factor. In addition, I conducted paired sample *t*-tests to further examine the within-group differences of the study outcomes from preassessment to postassessment.

Summary of Chapter 3

Chapter 3 provided an overview of the research questions and methods used in the study. The participants, setting, research design, and procedures were discussed in detail. The SBM intervention was described, and a data analysis plan was outlined.

Chapter 4

Results

Chapter 4 provides the results of the study. It begins with a review of the purpose of the study and is followed by the three research questions. The results are presented under each research question they sought to answer. Social validity results are presented. The chapter concludes with a description of treatment fidelity and interobserver agreements.

Purpose of the Study

The purpose of the study was to explore the effectiveness of a cognitive-based approach at improving the social communication skills of adolescents with ASD. The SBM intervention, which is one component of the Social Thinking® approach, was chosen for the study. The intervention group had 12 participants, and the treatment as usual group had 11. At week 5 of the study, one of the participants in the treatment as usual group had a family emergency and withdrew from the study. This resulted in the treatment as usual group having 10 participants. The characteristics of the participants for the two groups are detailed in Table 3.

Independent samples *t*-tests revealed no significant differences in the pretest scores of all the dependent variables, including student-reported SSIS scores, $t(20) = 1.404$, $p = .176$, parent-reported SSIS scores, $t(20) = -.326$, $p = .748$, SBM total test scores, $t(20) = 1.084$, $p = .291$, observed expected behavior measure, $t(20) = -1.746$, $p = .096$, and observed unexpected behavior measure, $t(20) = .494$, $p = .627$, indicating that the intervention and control groups were homogeneous.

Within the intervention group, preassessment student SSIS scores were positively correlated with their postassessment SSIS scores, $r = .741$, $p = .006$. Preassessment SBM

rating scale scores were not significantly correlated with postassessment SBM rating scale scores, $r = .462$, $p = .130$. Postassessment SBM rating scale scores were not significantly correlated with postassessment student SSIS scores, $r = .364$, $p = .244$.

Research Question 1

Does the SBM intervention increase the participants' observed ability to identify the components of the social emotional chain reaction (i.e., identifying the expected and unexpected behaviors of a given social context, the associated emotions of others, anticipated consequences, and the participants' own emotional response) measured by completing social behavior maps (preintervention and postintervention) by the participants?

A repeated-measures ANOVA was conducted to compare the effect of the SBM intervention on participants' ability to identify the components of the social emotional chain reaction. The Social Behavior Mapping Rating Scale total scores are presented in Table 4. The main effect for time of testing was statistically significant on the SBM rating scale total scores, Wilks' lambda = .469, $F(1, 20) = 22.632$, $p < .001$. The main effect for group on the SBM rating scale total scores across time was statistically significant, $F(1, 20) = 6.641$, $p = .018$. There was a statistically significant time by group interaction effect, Wilks' lambda = .290, $F(1, 20) = 49.012$, $p < .001$. The interaction indicated that the variation in the means on the SBM rating scale total scores over the repeated measurement varied as a function of intervention group membership. Paired sample *t*-tests showed a significant increase in the SBM total scores for the participants in the intervention group after the intervention as compared to the preintervention scores $t(11) = 7.541$, $p < .001$ but not for the treatment as usual group.

Research Question 2

Does the SBM intervention result in an improvement of social skills as reported by participants and parents on the Social Skills subscale of the SSIS?

Descriptive statistics of the SSIS Social Skills subscale scores can be found in Table 4. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on social skills as reported by the participants on the SSIS Social Skills subscale between the intervention and control groups. The main effect of time of testing was statistically significant, Wilks' lambda =.741, $F(1, 20) = 6.996$, $p = .016$. The main effect for group was not significant. There was a statistically significant time by group interaction effect, Wilks' lambda = .781, $F(1, 20) = 5.595$, $p = .028$. The interaction indicated that the variation in the means on the participant-reported SSIS Social Skills subscale scores over the repeated measurement varied as a function of intervention group membership. Paired sample *t*-tests were conducted to examine within-group differences in the student-reported social skills from preassessment to postassessment and revealed that there was a significant increase in the student-reported social skills scores within the intervention group after the intervention as compared to the preassessment scores $t(11) = 3.574$, $p = .004$, not for the treatment as usual group (see Table 4).

The descriptive statistics for the parent-reported SSIS Social Skill subscale can be found in Table 4. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' social skills as reported by parents on the SSIS. The main effects for time of testing and group were not statistically significant on the parent-reported scores. There was not a statistically significant time by group interaction effect, Wilks' lambda = .875, $F(1, 20) = 2.858$, $p = .106$. The interaction indicated that the variation in the

means on the parent-reported SSIS Social Skill subscale scores over the repeated measurement did not vary as a function of intervention group membership.

Research Question 3

Does the SBM intervention increase the number of participants' observed expected behaviors and decrease the number of participants' observed unexpected behaviors?

Total Observed Expected Behaviors

A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed expected behaviors. The total number of observed expected behaviors (i.e., verbal and nonverbal) in both social contexts (i.e., snack/dinner and games/activities/sensory gym) was combined. The descriptive statistics can be found in Table 5. There was not a statistically significant time by group interaction effect, Wilks' lambda = .816, $F(2, 19) = 2.143$, $p = .145$, which indicated that the variation in the means on the total expected behaviors over the repeated measurement did not vary as a function of intervention group membership. The main effect of time was statistically significant on the number of expected behaviors the participants demonstrated, Wilks' lambda = .511, $F(2, 19) = 9.089$, $p = .002$. The main effect of group on the total expected behaviors was not statistically significant.

Further analysis was conducted on the total number of initiations (one specific type of expected verbal behavior) as this is something that clinician's often target in therapy. For this analysis, all of the initiations, regardless of the social context (i.e., snack/dinner and game/activity/sensory gym) was calculated and analyzed. The descriptive statistics can be found in Table 3. A repeated measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed initiations. There was not a statistically

significant time by group interaction effect, Wilks' lambda = .981, $F(2, 19) = .186$, $p = .832$. The main effect of time was not statistically significant on the participants' initiations, Wilks' lambda = .848, $F(2, 19) = 1.708$, $p = .208$. The main effect of treatment group on the total initiations was not statistically significant, $F(1, 20) = .108$, $p = .745$. The interaction indicates that the variation in the means on the total initiations over the repeated measurement did not vary as a function of intervention group membership.

Total Observed Unexpected Behaviors

A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed unexpected behaviors. The total number of observed unexpected behaviors (i.e., verbal and nonverbal) in both social contexts (i.e., snack/dinner and games/activities/sensory gym) was combined. The descriptive statistics can be found in Table 6. There was not a statistically significant time by group interaction effect, Wilks' lambda = .986, $F(2, 19) = .130$, $p = .878$. The interaction indicated that the variation in the means on the total number of unexpected behaviors over the repeated measurement did not vary as a function of intervention group membership. The main effect of time was statistically significant on the number of unexpected behaviors the participants demonstrated, Wilks' lambda = .566, $F(2,19) = 7.274$, $p = .005$. The main effect of group on the total unexpected behaviors was not statistically significant, $F(1, 20) = .501$, $p = .487$.

Analysis of Four Subcategories of Observed Expected and Unexpected Behaviors

Further data analysis was conducted for observed behaviors into four categories: expected verbal behaviors, expected nonverbal behaviors, unexpected verbal behaviors, and unexpected nonverbal behaviors. The data were also separated by the type of social context: snack/dinner and the games/activities/sensory gym observations.

Expected Verbal Behaviors During Snack/Dinner. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed expected verbal behaviors during snack/dinner. The expected verbal behaviors during snack/dinner total scores descriptive statistics can be found in Table 5. There was a statistically significant time by group interaction effect, Wilks' lambda = .714, $F(2, 19) = 3.806$, $p = .041$. The main effect of time was not statistically significant on the observed expected verbal behaviors during snack/dinner, Wilks' lambda = .767, $F(2, 19) = 2.885$, $p = .08$. The main effect of treatment group on the expected verbal behaviors during snack/dinner across time was not statistically significant, $F(1, 20) = .012$, $p = .916$. The interaction indicates that the variation in the means on the expected verbal behaviors during snack/dinner observations over the repeated measurement varied as a function of intervention group membership.

Expected Nonverbal Behaviors During Snack/Dinner. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed expected nonverbal behaviors during snack/dinner. The expected nonverbal behaviors during snack/dinner total scores descriptive statistics can be found in Table 5. There was not a statistically significant time by group interaction effect, Wilks' lambda = .971, $F(2, 19) = 0.284$, $p = .756$. The main effect of time was not statistically significant on the participants' observed expected nonverbal behaviors during snack/dinner, Wilks' lambda = 0.850, $F(2, 19) = 1.672$, $p = .214$. The main effect of treatment group on the expected nonverbal behaviors during snack/dinner across time was not statistically significant, $F(1, 20) = 1.177$, $p = .291$. The interaction indicates that the variation in the means on the

expected nonverbal behaviors during snack/dinner observations over the repeated measurement did not vary as a function of intervention group membership.

Unexpected Verbal Behaviors During Snack/Dinner. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed unexpected verbal behaviors during snack/dinner. The unexpected verbal behaviors during snack/dinner total scores descriptive statistics can be found in Table 6. There was not a statistically significant time by group interaction effect, Wilks' lambda = .919, $F(2, 19) = .839$, $p = .448$. The main effect of time was not statistically significant on the participants' observed unexpected verbal behaviors during snack/dinner, Wilks' lambda = .961, $F(2, 19) = .383$, $p = .687$. The main effect of treatment group on the unexpected verbal behaviors during snack/dinner across time was not statistically significant, $F(1, 20) = .078$, $p = .783$. The interaction indicates that the variation in the means on the unexpected verbal behaviors during snack/dinner observations over the repeated measurement did not vary as a function of intervention group membership.

Unexpected Nonverbal Behaviors During Snack/Dinner. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed unexpected nonverbal behaviors during snack/dinner. The unexpected nonverbal behaviors during snack/dinner total scores descriptive statistics can be found in Table 6. There was not a statistically significant time by group interaction effect, Wilks' lambda =.731, $F(2, 19) = 3.504$, $p = .051$. The main effect of time was not statistically significant on the participants' unexpected nonverbal behaviors, Wilks' lambda = .769, $F(2, 19) = 2.862$, $p = .082$. The main effect of group on the unexpected nonverbal behaviors during snack/dinner across time was not statistically significant, $F(1, 20) = .398$, $p = .535$. The interaction

indicates that the variation in the means on the unexpected nonverbal behaviors during snack/dinner observations over the repeated measurement did not vary as a function of intervention group membership.

Expected Verbal Behaviors During Games/Activities/Sensory Gym. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed expected verbal behaviors during games/activities/sensory gym. The expected verbal behaviors during games/activities/sensory gym total scores descriptive statistics can be found in Table 5. There was a statistically significant time by group interaction effect, Wilks' lambda = .664, $F(2, 19) = 4.811$, $p = .02$. The main effect of time was not statistically significant on the participants' expected verbal behaviors during games/activities/sensory gym, Wilks' lambda = .732, $F(2, 19) = 3.485$, $p = .051$. The main effect of group on the expected nonverbal behaviors during games/activities/sensory gym across time was not statistically significant, $F(1, 20) = .924$, $p = .348$. The interaction indicates that the variation in the means on the expected verbal behaviors during the games/activities/sensory gym observations over the repeated measurement varied as a function of intervention group membership.

Expected Nonverbal Behaviors During Games/Activities/Sensory Gym. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed expected nonverbal behaviors during games/activities/sensory gym. The expected nonverbal behaviors during games/activities/sensory gym total scores descriptive statistics can be found in Table 5. There was not a statistically significant time by group interaction effect, Wilks' lambda = .838, $F(2,19) = 1.842$, $p = .186$. The main effect of time was statistically significant on the participants' expected nonverbal behaviors during

games/activities/sensory gym, Wilks' lambda = .423 $F(2, 19) = 12.937$, $p < .001$. The main effect of treatment group on the expected nonverbal behaviors across time was not statistically significant, $F(1, 20) = 1.976$, $p = .175$. The interaction indicates that the variation in the means on the expected nonverbal behaviors during the games/activities/sensory gym observations over the repeated measurement did not vary as a function of intervention group membership.

Unexpected Verbal Behaviors During Games/Activities/Sensory Gym. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed unexpected verbal behaviors during games/activities/sensory gym. The unexpected verbal behaviors during games/activities/sensory gym total scores descriptive statistics can be found in Table 6. There was not a statistically significant time by group interaction effect, Wilks' lambda = .863, $F(2, 19) = 1.511$, $p = .246$. The main effect of time was not statistically significant on the participants' unexpected verbal behaviors during games/activities/sensory gym, Wilks' lambda = .745, $F(2, 19) = 3.256$, $p = .061$. The main effect of group on the unexpected verbal behaviors during games/activities/sensory gym across time was not statistically significant, $F(1, 20) = 0.650$, $p = 0.430$. The interaction indicates that the variation in the means on the unexpected verbal behaviors during the games/activities/sensory gym observations over the repeated measurement did not vary as a function of intervention group membership.

Unexpected Nonverbal Behaviors During Games/Activities/Sensory Gym. A repeated-measures ANOVA was conducted to compare the effects of the SBM intervention on participants' observed unexpected nonverbal behaviors during games/activities/sensory gym. The unexpected nonverbal behaviors during games/activities/sensory gym total scores

descriptive statistics can be found in Table 6. There was not a statistically significant time by group interaction effect, Wilks' lambda = .828, $F(2, 19) = 1.971$, $p = .167$. The main effect of time was statistically significant on the participants unexpected nonverbal behaviors during games/activities/sensory gym, Wilks' lambda = .547, $F(2, 19) = 7.868$, $p = .003$. The main effect of treatment group on the expected nonverbal behaviors during games/activities/sensory gym across time was not statistically significant, $F(1, 20) = 1.200$, $p = .286$. The interaction indicates that the variation in the means on the unexpected nonverbal behaviors during the games/activities/sensory gym observations over the repeated measurement did not vary as a function of intervention group membership.

Social Validity

Participants

The first question asked was whether the participants enjoyed coming to the group. In the intervention group, all of the participants responded that they enjoyed coming to the group. The majority of the responses were brief (i.e., "Yes"), but several responses provided more detail. They described having fun and enjoying the activities. They said they enjoyed meeting new people and talking to others. One participant said she made a connection with another participant in the group. Three of the participants in the intervention group said they enjoyed the group but qualified their comments by saying "mostly" or "sometimes." They said they felt overwhelmed and uncomfortable at times. In the treatment as usual group, all of the participants said they enjoyed coming to the group. Some of the participants' written comments: "I felt very heard and understood. . . . I enjoyed meeting people who are like me. . . . I enjoy spending time with friends. . . . I very much enjoyed this social group experience. .

. . I did fun activities and made new friends. . . . I enjoyed hanging out with kids my age, and yes, very much."

The second question asked whether the participants found the SBM intervention helpful and if they believed they learned anything. In the intervention group, every participant responded with an affirmative "Yes." Some of them elaborated and said SBM was helpful, that it helped them lay things out, helped them to handle social situations better, that it helped them learn what was and wasn't expected, and that they gained more experience in social situations. In the treatment as usual group, several of the participants asked the PI what SBM was because they said they were not given instruction on it in the treatment as usual condition. The PI instructed them to ignore that part and just answer the second part of the question, which asked if they learned anything. In the treatment as usual group, eight participants said they learned something. One participant in the treatment as usual condition wrote, "I learned more on how to socialize without being rude." The participants said they learned to get along with their friends, how to get to know new people, and how much wider the autism spectrum is. Another participant in the treatment as usual group wrote, "It helped me to loosen up and feel more normal about my differences." Two of the participants in the treatment as usual group said they didn't learn anything, but one elaborated and wrote ". . . but I thought the group was nice."

The third question asked if the participants thought more about what was expected and unexpected in social situations. Ten of the participants in the intervention group replied "Yes," with minimal to no elaboration. One participant elaborated and wrote, "I'm more aware now and noticing what's happening." Two of the participants in the intervention group replied with "I don't know" and "I don't think about either. I just talk and act when I want

to." In the treatment as usual group, seven participants responded with an affirmative "Yes." Many of the responses were one word answers, but some of the elaborated responses were: "I understand more of what social rules there are: waiting turn to talk, small talk, eye contact, and listening." Other replies: "I tend to be more aware of my behavior in a public setting, especially in a social group. . . I want to make sure I have a good first impression." One of the participants said, "I'm not really sure" and two responded with "No." One said, "No, because I already knew," and other replied "No," but to her, that was a good thing. She wrote, "No, I think about it a little less, but that's good because I overthought it way too much."

The fourth question asked if the participants had anything else they would like to share, positive or negative. The majority of the participants in the intervention group offered no additional feedback. One participant wrote, "I like the snacks. I also like the people I met. This group was quite enjoyable, and I found it fun." Another participant in the intervention group said, "I love being at the group. I feel comfortable, and I have a lot of fun. . . . What I enjoy most is being around the other people and chatting." Another participant wrote, "The group was really great." Only one participant voiced concern, writing, "I don't have much to share, but I did feel like I had no shared interest with everyone else. It was hard to communicate." This individual reported on an earlier question that she sometimes liked coming to the group but that at times she felt uncomfortable. In the treatment as usual group, there was either no additional feedback or positive feedback was given. For example, one participant in the treatment as usual group wrote, "I'm really happy that I attended this as I made a great friend. . . . What I liked about the group is doing fun activities with my friends. .

. . I love hanging out with other kids my age." And, "Crafting was fun, and I was enjoying the snacks."

Parents

On the social validity questionnaire, it is important to note that several of the parents approached the PI and asked what some of the terms in the questionnaire meant because they were unfamiliar with the terminology "expected" and "unexpected" behavior. The PI explained the terms. During the study, in an attempt to not introduce bias that might affect the results of the study, no feedback was given on what was occurring during the group sessions. When the parents were unsure what the question meant, the PI provided clarification.

The first question asked the parents if they had seen any increase in their child's expected behaviors in other settings. In the intervention group, eight parents responded with an affirmative answer and four responded with "No." Some of the affirmative responses included the following: "I have noticed that he is reading my physical or verbal queries when we are conversing much better. . . . I have seen her take part in a conversation with one or two other teens more often. . . . He was more alert and exited to interact with peers (during a school function) . . . . She is more willing to discuss things she perceives as unfair." In the treatment as usual group, seven parents responded with an affirmative answer, and three said they had not noticed any changes. Some of the parents reported that their child was more interactive with others: 'He is more expressive in ways appropriate to the social context and interacts with others more frequently" and "He initiates conversation, has back and forth conversations, and engages with two or three peers at the same time" and "He is becoming more comfortable joining in with peers in their activities." One parent said their child

developed friends in the group, and another said their child was “trying a little more to put herself out there to meet more people.” One parent in the treatment as usual group said their child’s teacher noticed good active-listening skills, and another parent said their child did not refuse to go to the social group, which is what they were expecting.

The second question asked the parents if they had seen any decrease in their child’s unexpected behaviors in other settings. In the intervention group, seven of the parents said no, but it is important to note that it is conceivable that not all of the parents had concerns with their child having “unexpected” behaviors. Their understanding and definition of unexpected behaviors is not necessarily the same as the clinical definitions used for this study. Five of the parents in the intervention group reported a decrease in their child’s unexpected behaviors. One said that their child does not follow them around as much at social functions, which their child previously did because the child did not know what to do with herself socially. Another parent in the intervention group said the frequency of fighting with a sibling was significantly decreased and that they were “hanging out” more. One parent said, “She will sit and talk about it, instead of holding it in, and talk what she thinks about and plan on how to fix it.” One parent in the intervention group reported that the school staff reported that the child was more “polite.” In the treatment as usual group, four of the parents reported a decrease in their child’s unexpected behaviors, three said they had not seen a change in their child’s behavior, and three said this question did not apply to their child. One parent reported a decrease in avoidance behaviors, where prior to participating in the group, their child would avoid social interactions more often. Another parent said their child seemed happier with other peers and less withdrawn after participating in the group. Overall, the parents reported fewer unexpected behaviors while referencing a decrease in social

avoidance and being withdrawn and an increase in social interaction. One parent noted that the unexpected behavior of "talking back" in public had decreased.

The third question asked the parents if they had seen any positive or negative changes in their child since starting the intervention. In the intervention group, 11 of the parents reported a positive change. One said they did not see a change at all. Some of the positive changes reported by parents in the intervention group were: "She seems to stand up for herself more. . . . Relationships are being established. . . . She is very happy that she comes here and has a new friend. . . . He has become more talkative with adults that are familiar to him. . . . He seems to be more patient with himself when trying to explain something. . . . We still have arguments and breakdowns, but I don't think they last as long. . . . Very positive changes; seems to be much more socially aware and sensitive in family situations and showing great empathy. Trying harder to push when out of his comfort zone."

In the treatment as usual group, six of the parents reported a positive change, and four said they noticed no changes. Of the six parents who reported positive changes, the theme was an overall increase in social interaction: "More communicative and expressive about feelings. . . . More expressive and more social. . . . More talkative and engages appropriately. . . . Less hesitant to approach someone." Another theme noted was that parents in the treatment as usual group reported that their child was excited and happy to attend the group.

The fourth question asked the parents what they liked or disliked about the intervention and overall experience. In the intervention group, 11 of the parents said they liked the intervention, and one parent had a neutral response. No parent in the intervention group had a negative response. A common response by the parents was that their child liked coming and looked forward to the group: "He looked forward to the day and seeing his peers.

. . . He was excited about it every week." One parent said they enjoyed the set time and the structure of the group (i.e., snack followed by an activity). The PI did not specifically tell the parent about the structure within the group, but it is likely that the participant shared this detail. Several parents reported that they didn't know much about what was going on because their child didn't tell them but that they enjoyed the intervention because their child liked coming and enjoyed being with the other participants. Two parents said their child's participation allowed the child to "work with a diverse group of kids" and that the group provided an "opportunity to see outside her circle of friends." In the treatment as usual group, all of the parents reported something that they liked about the group and had only positive feedback. The overall theme was that their child enjoyed the group and that friendships were developed. Parents reported the following: "She felt comfortable enough to make friends in this meeting. . . . Enjoyed meeting another person who she could relate to. . . . Went every week without complaint . . . had positive things to say more and more as time went on. Really likes the kids. . . . It's the first time he's made a friend that he wants to engage with outside of group. . . . He expressed how he had fun and enjoyed meeting new people." One parent reported an increase in their child's tolerance of social gatherings, another reported an increase in responsibility as their child was making sure to drive himself to and from each of the groups, and another said their child was "more aware of back and forth aspects of conversation."

The fifth question asked the parents for any additional feedback. In the intervention group, many of the parents did not provide any. But one parent wrote, "I appreciate how respectful you are to the teens, demonstrating how to treat others in a way that shows they matter." Another parent wrote, "I really like it because it gives her time to be with peers who

are on her level." Several other parents reiterated how their child enjoyed coming to the group. One described the importance of the child being physically comfortable, noting the child was getting too hot in the room and suggested lowering the temperature. Another parent wished that a group like this one was closer to where they lived. In the treatment as usual group, the parents either had no additional feedback or they had positive feedback. Overall, the parents reported liking the social group and were appreciate. Some of their feedback: "The activities really draw out the kids' personalities. They seemed to express themselves freely. . . . It has been a positive experience. . . . I think this social group is a great idea. I wish I could find more groups/activities for teens. She was always looking forward to the meeting. . . . It has been a great group. Thank you!" One parent noted the increase in conversation with their child on the drive to and from the group sessions. One parent asked for assistance in connecting with other parents and suggested a mixer to help foster friendships outside the group setting.

Treatment Fidelity

Treatment fidelity was established by having another licensed speech language pathologist familiar with SBM measure treatment fidelity of the sessions during which direct instruction on SBM occurred. A checklist was provided to measure treatment fidelity (see Appendix E). A total of 20% of the intervention sessions were observed, and a checklist was completed for each session. Thirty-six treatment sessions were held during which direction SBM instruction occurred; eight of them were observed. Treatment fidelity was calculated by adding the total number of points earned divided by the total possible points and multiplying by 100. The maximum number of points per session was 12; the total number of possible points for the observed intervention sessions was 96. Treatment fidelity was 100%.

Interobserver Agreement

Interobserver agreement (IOA) was collected on a minimum of 20% of the videotaped sessions. Videotaped sessions were independently rated by two coders to assess IOA. IOA was established by taking the sum of the agreements divided by the sum of agreements and disagreements. The total number of videos was 132 (10 min each), and each was coded for observational data, and 27 of them were independently rated by two coders. IOA was 97.52%.

The coders were licensed speech-language pathologists familiar with Social Thinking® and trained in the coding procedure for the study. Both were unaware of the purpose and design of the study. Both were blind to the participants' group assignment and did not know if the video clip they observed occurred preassessment, postassessment, or generalization. While the coders were able to differentiate between the snack and dinner and the game/activity and the gym time, they were unaware of the order in which those events occurred and did not know the purpose behind the different type of sessions. The coders were trained extensively on the behavioral definitions and practiced observing sample videos prior to coding the research data. They were provided the definitions of expected and unexpected behaviors (Appendix F) and tallied the frequency of each of the expected and unexpected behaviors for each participant on the provided data collection sheet (Appendix G).

Summary of Chapter 4

Findings of the study were mixed. The SBM rating scale scores showed that SBM intervention increased the participants' observed ability to identify components of the social emotional chain reaction (i.e., identifying the expected and unexpected behaviors of a given social context, the associated emotions of others, anticipated consequences, and the

participants' own emotional response) measured by completing social behavior maps (preintervention and postintervention) by the participants. The SSIS scores were split, with the participants reporting a significant improvement in their social skills and the parents not reporting a significant improvement in their child's social skills. The observational data did not reveal significant results. No increase was observed in the participants' expected behaviors nor was a decrease observed in the participants' unexpected behaviors.

Chapter 5

Discussion

Chapter 5 provides an in-depth discussion of the major findings of the study. All components of the study are discussed, including that of the participants, the setting, and the specific measures used in the study. The chapter concludes with the implications for practice and future research. Lastly, recommendations are made.

Participants

Participants in both the intervention group and treatment as usual group were similar demographically, despite being matched only by age and IQ. Females were represented in both groups, making up 45% of the participants in the study. That percentage was an overrepresentation when compared to the 3:1 male-to-female ratio of ASD in general populations (Looms et al., 2017). Racial profiles of the group were similar, with the majority of the participants self-reported as white. Approximately 73% of participants had a coexisting mental health diagnosis, a figure consistent with data in DSM-5. The DSM-5 states that approximately 70% of individuals with ASD have a coexisting mental illness. In both groups, the majority of the participants came from a home with at least two adults. Only one participant in the entire study reported having only one adult in the home. Data on the relationships of those living in the home was not collected; only the number of adults and children living in the house was collected. It is possible that not all of the adults in the households were parents and might have been other adults, such as a sibling or grandparent. The number of adults in the home was important because it was one indicator of the level of support within the home. All of the participants' parents had some college education, with the majority of the parents (72%) saying they held at least a bachelor's degree. A wide range

of socioeconomic statuses was represented among the participating families, ranging from an annual household income of $30,000 to $39,000 to more than $150,000. Some of the families (i.e., 78.9 %) had an annual household income of more than $70,000, according to data collected for the study. When generalizing the result of the study, it is important to consider the demographics of the participants.

Setting

It is worth noting that the study was conducted in a structured setting (i.e., a therapy clinic). However, every effort was made to plan for generalization and to carry out the intervention in a setting that was as natural as possible. That is why the PI chose social situations in which the adolescents were likely to engage (i.e., snack and games/activities). The intervention was intentionally designed to only have a short instructional period, with more time being spent practicing the targeted skill in a natural social context that included supportive feedback.

SBM Rating Scale Scores

Consistent to findings from Clavenna-Deane's (2010) doctoral dissertation, this study reported positive outcomes as a result of instruction in Social Thinking® SBM. Findings from the study revealed that SBM intervention was effective in increasing participants' observed ability to identify components of the social emotional chain reaction based on the SBM rating scale. In as little as 8 weeks, the participants made improvement in their social cognition, which is a primary purpose of a cognitive-based intervention (Leaf et al., 2016). With cognitive based interventions, the focus is on changing cognition which will ultimately lead to a change in behavior. By focusing on the underlying cognitive processes, versus

focusing solely on the external behavior as in a purely behavioral approach, the change in behavior is more likely to be maintained and generalized to other situations.

In this study, the participants were able to identify the expected and unexpected behaviors of a social context and how the expected/unexpected behaviors impacted how others felt about their behavior. For example, if the participants chewed with their mouth open it would make other people feel annoyed. The participants were able to take it a step further (i.e., proceed down the social emotional chain reaction) and described the potential consequences and how it would make them feel. For example, if other people felt annoyed they would be less likely to sit with the participant in the future, and ultimately that likely would make the participant feel lonely. The participants were able to identify the components of two previously taught social behavior maps and were able to apply what they learned to a different social situation. Of importance was that only two social contexts (i.e., eating snacks with peers and participating in games/activities with an adult present) were directly taught during the intervention. Yet the participants were able to generalize the learned skill to a new social context that was not taught in the intervention (i.e., attending a party with peers and adults). That development demonstrated a level of generalization because the participants were able to fill out a social behavior map for a social context on which they had not received direct instruction. The participants were able to take what they had learned from the previous social context and apply it to a new social context. It is important to note that the social contexts were similar yet were different enough that a level of generalization was attained. Both studies looked at SBM, but this study employed a group design whereas Clavenna-Deane's study used a single-subject design. My study was the second to report positive findings on SBM.

Consistent with Lee's (2009) study, rating scales specific to the intervention were developed and used to evaluate the effectiveness of the intervention. The PI developed SMB rating scales based on the 10 steps of SBM, and Lee's (2009) study used a rating scale based on the ILAUGH components of Social Thinking®. Both studies reported improvement on the rating scales.

This study used observation measures and procedures similar to the study by Crooke et al. (2008) study. The definitions of expected and unexpected behaviors for this study were adapted from Crooke et al.'s study. However, the findings of the observational data from this study were inconsistent with Crooke et al.'s findings. Crooke et al.'s study showed an increase of expected behavior and a decrease of unexpected behavior. No significant findings on observational data were found as a result of the intervention in this study. However, while both interventions used Social Thinking®, the interventions that each study used were different.

Social Skills Reported by Participants and Their Parents

There were mixed results on the SSIS social skills subscale standard scores, with the participants and their parents having different results. That is not uncommon, as mixed results have been reported in the literature of self-report measures on social skills. For instance, Webb et al. (2004) and Ozonoff and Miller (1995) reported no significant findings in their self-report measures. However, research by Turner-Brown et al. (2008), Tse et al. (2007), Bauminger (2002), and Stichter et al. (2010) found statistically significant findings in the self-report measures used in their studies. Although all of these studies reported some increases in social skills, the self-report measures and questionnaires did not always show these improvements. That speaks to the nature of self-report measures and questionnaires in

general: They are based on perceptions of the reporter, which may or may not accurately reflect what is actually taking place. While useful, self-report measures must be interpreted with caution because they can be impacted by an individual's bias. Often, participants in an intervention have an invested interest to see an improvement and that can impact their reported scores.

Participant-Reported Social Skills (SSIS–Participant)

The SBM intervention resulted in an improvement of social skills as reported by the participants on the Social Skills Subscale of the SSIS. It is important to note that the SSIS is a self-report measure and that the SSIS Social Skills subscale describes the participants' perception of their social skills. Findings suggest that participants perceived an improvement in their social skills, but the parents did not report the same findings. Several explanations are possible. It is possible that the participants perceived an improvement in their social skills and their parents' did not notice. It is possible the participants perceived an improvement, but their social skills actually did not change and/or the change was too small to be noticed by others. The change the participants reported on the SSIS might refer to the change in their social cognition as a result of the SBM intervention, as evidenced by the SBM rating scale scores. The SBM intervention taught the participants the social emotional chain reaction which had the participants thinking about things they may never have thought about before (i.e., how their actions are affecting others). The participants might have perceived this change in their thinking as a change in their performance of a skill.

Nevertheless, accounting for one's perception of their social skills and any improvement is important to consider. If the participants saw no improvement in their social skills, their motivation to continue to try to improve could have been affected. The

participants might have believed it was not worth the effort, that it was too hard, and/or that they simple were not capable of changing. The reverse could also be true with the participants perceiving they are making progress, when in fact they may not be, leading them to not see the need to continue to work on it. There are many possible interpretations for the participant ratings on the SSIS social skills subscale. However, I think overall it is a positive finding and it is a starting point.

Parent-Reported Social Skills (SSIS–Parent)

As for the parents' reported scores on the social skills subscale of the SSIS, there were no statistically significant findings. The parents did not report an improvement on their child's overall social skills. That could be attributed to the short duration of the intervention and the fact that it takes time for learned skills (i.e., identifying components of the social emotional chain reaction) to be reflected in an improvement in overall social skills as measured by a social skills rating scale. Additionally, the SSIS might not have been sensitive enough to measure small changes. The questions on the SSIS are broad, and some pertained to overall social skills and assessed some skills that were not directly taught in the intervention. For instance, some of the questions were as follows: respects the property of others, completes tasks without bothering others, forgives others, and is well-behaved when unsupervised. These skills were not directly covered in the intervention. Other questions were more closely tied to elements addressed in the intervention. For instance: follows rule when playing games with others, tries to understand how you feel, starts conversations with peers.

The discrepancy between the participants and parents reported SSIS scores showed a disconnect between how the participants perceived themselves and how their parents

perceived them. Part of this is due to the ASD diagnosis which includes difficulty with perspective taking skills and being aware of how others perceive them. For example, an individual with ASD may report they had a great conversation with someone, when in reality they were talking "at" someone versus talking "with" someone. Therefore, the diagnosis of ASD alone may account for the discrepancy in the participants and parents SSIS scores.

Observed Behaviors

Although the SBM intervention increased participants' ability to identify components of social emotional chain reaction based on the SBM measure, it is worth noting that the intervention did not increase the number of participants' observed expected behaviors or did not decrease the number of participants' observed unexpected behaviors as anticipated based on the direct observational measures.

There are multiple reasons why no statistically significant effects were found based on observational measures. One reason could be attributed to the small sample size. Given a larger sample size, it is possible that the differences observed would be statistically significant. For instance, when the level of the expected verbal behavior (i.e., initiations) was broken down, there was an increase in the mean preintervention and posintervention for the level of initiations, but it was not statistically significant. Another factor was the short duration of the intervention. The intervention lasted only 8 weeks, with an additional week for generalization. However, the instruction was for only 20 minutes each week (weeks 2 through 7). During the 1st and 8th weeks, the participants took part in the snacks and games/activities (i.e., the naturalistic activities) but did not receive instruction in SBM. That length of time was adequate to teach the concepts of SBM and the social emotional chain reaction, yet it might not be long enough for the participants to apply what they had learned

to real-life social situations (i.e., snacks, games, activities). When learning a new skill, one first must learn the skills (skill knowledge), but then they have to learn how to apply what they have learned (skill performance). Skill knowledge and performance knowledge are two distinctive concepts. Their difference accounts for why individuals may know a certain social skill (i.e., that it is expected to face someone when talking to them) but they lack the ability and skill to perform it.

Another factor that could account for the lack of significant findings was the level of variance among the groups in terms of activities chosen. For instance, participants in some groups chose games that facilitated more conversation and social interaction. Whereas, there were games where the cognitive demands were higher (i.e., more challenging games or it was a new game they had never played and thus they were busy focusing on learning how to play the game versus interacting with one another), less social interaction occurred.

Social Validity

Consistent with studies by Davis et al. (2010), Scattone et al. (2006), and Hughes et al. (1996), the results of the social validity from both the parents and participants were promising. Regardless of the group assignment (i.e., intervention or treatment as usual), all of the parties involved reported positive feedback. The participants, regardless of the condition, enjoyed being with their peers, socializing, and engaging in high-interest activities (snacks and games). Friendships were developed, and in several groups, the participants began to correspond outside of the group (i.e., via phone, online video games, and meeting in person). By the end of the study, three of the four participants in one group were meeting regularly outside of the group. In many of the groups, the participants referred to other group participants as their friends, even though the PI did not introduce the participants as friends

or refer to them as friends. However, over a period of 8 weeks, many of the participants began to refer to one another as friends. In one group, the participants brought each other small presents and gave each other thoughtful cards with handwritten notes inside.

The results of the social validity questionnaires from the participants and parents were informative. They showed that both parents and participants saw an improvement in social skills and enjoyed the intervention. In the few instances where improvements were not observed, parents and participants reported that they liked the group. No one reported that they did not like the group, and only a few participants reported being overwhelmed at times (which was to be expected for some, given that social interaction is challenging for individuals with ASD). But even the few participants who said they were overwhelmed at times, they still had overwhelmingly positive feedback for the group. One reoccurring theme that emerged was the value in developing friendships and having a place to meet others with ASD.

Another important factor to note was the high retention rate during the study; 22 of the 23 participants remained in the study. That speaks to the value that parents and participants saw in the social skills groups. After the study ended, the participants and parents had the option to continue with social groups at the PI's therapy clinic. Of the 22 participants, 19 chose to continue with social groups. Two individuals had to take a break over the summer due to other obligations but planned to return to the clinic after the summer was over. The one participant who did not attend a social group cited the distance from home to the clinic as an impediment. Had the clinic been closer to where they lived, they would have continued, the participant's parents said.

Limitations

There were three limitations of the study. First, the sample size of the study was relatively small. Given a larger sample size, some of the results might have been statistically significant. A larger sample size would also mean more generalizability of the findings.

Second, the families that participated in the study reported high levels of education, with everyone having some college experience. The families also had high levels of income, and all but one had two or more adults in the home. Families of lower socioeconomic status and lower levels of education were not as equally represented. Additionally, the majority of the families were white. It is important to note that family demographics might play a contributing factor in who chooses to participate in a research study. For instance, individuals with higher education, greater income, and/or more than one adult in the home may have the additional resources necessary to commit to a research study. While the groups were similar in terms of participant and family demographics, it was also specific. Generalizability of the results is limited to individuals who are similar to the participants in the study.

The final limitation was the short duration of the study, which likely accounted for why there was not an increase in observed expected behaviors and why there was not a decrease in observed unexpected behaviors. It takes time for participants to apply what they have learned to real-life settings, and it might take more time than the duration of the study to change participants' behavior.

Implications for Practice and Future Research

Many times, individuals with ASD are not aware of what is expected or unexpected in a social situation and do not realize that their behavior affects how people think and feel about them, all of which are factors that ultimately impact how people treat them. For

instance, if they make true but harsh statements to a classmate, their classmate might feel uncomfortable. If they make a classmates feel uncomfortable, the classmate is less likely to want to socialize with them, and then they might feel lonely. But when one complements a classmate they make the classmate feel good, and that could entice the classmate to want to spend more time with them, thus both parties might be happier. Individuals with ASD have deficits in their social cognition (Winner, 2007). SBM directly addresses these deficits.

The underlying premise of Social Thinking® and other cognitive-based approaches is that a change in behavior results from changing one's thought processes or thinking (Leaf et al., 2016). It is not about teaching a discrete set of social skills. It is about changing one's social thinking which improves social behaviors, social interactions, and relationships (Leaf et al., 2016). Social Thinking® addresses perspective taking and recognizing that people have thoughts and feeling about us and that there is a direct correlation with how we act and how others think and feel about us (Winner, 2007). In teaching the social emotional chain reaction, participants are made more aware of how their behavior affects others and ultimately affects how people treat them. Such cause-and-effect interactions may seem to be an obvious connection, it is not readily apparent for many individuals with ASD. The results of this study show that individuals are able to learn the social emotional chain reaction. The participants reported a change in their social skill per SSIS-student scores and reported that they are thinking more about what is expected and unexpected in social situations (per social validity).

This study showed that the SMB intervention was effective in teaching this social emotional chain reaction to adolescents with ASD. In as little as 8 weeks, the participants improved in their social cognition and believed their social skills improved. The participants

enjoyed participating in the intervention and chose to continue with the social groups even after the study ended. The parents were happy with the social groups and saw value in the groups, even in the few instances where no social skills improvements were reported. The study utilized naturalistic activities (i.e., snacks and games and activities) to help plan for and aid in generalization. The fact that participants and parents liked the intervention is important when determining the kinds of interventions to use.

SBM intervention is a viable option in the clinic setting and was easily embedded into a 60-minute, weekly format. Participants learned the social emotional chain reaction in a small-group format. They enjoyed the snack and the engaging activities; they responded well to the choices built into the intervention. The study showed that one can plan for generalization by incorporating naturalistic activities into a group. The participants correctly completed an SBM for a new social situation that was not part of the direct instruction. That means the potential exists for them to be able to apply what they have learned in a clinical setting to other social situations and to be able to apply what they have learned about a social context (i.e., snacks) and apply it to a similar social context (i.e., dinner). It is impossible to teach every social context, which is why the goal was to change how the participants thought about social situations. The goal was to change how they thought about social situations so they could apply what they learned to social contexts they encountered. A future direction for research is to do more true experiments on SBM and Social Thinking®.

Recommendations

More research on social behavior mapping and Social Thinking® is recommended for adolescents with ASD. Research involving a larger sample size and a longer intervention would be beneficial. Research involving a group of participants more ethnically and

educationally diverse would extend the generalizability of the study's findings. Additionally, it is recommended to continue to use multiple measures to evaluate the effectiveness of an intervention (i.e., questionnaires, direct observation, social validity, etc.). For research incorporating direct observational data, it would be beneficial to have the same context across groups, versus varying the type of activities. The PI thought that having the same social context was sufficient and that including choice would not impact the results, but the PI noticed a change in social interaction that varied with the type of game being played. So while the intervention can involve more choices, for observational data collection, the PI recommends having the same activity for preassessments and postassessments. That would allow a researcher to eliminate the influence of different activities on expected and unexpected behaviors.

The social validity questionnaires were informative and provided valuable insight into what the parents and participants valued about the social skills group. A resounding theme was the development of friends and relationships and having a venue in which to interact socially with others in a fun way. Additional qualitative research on the benefits and value of social skills groups from parents and participants is warranted. It is also worth exploring ways, in addition to direct social skills instruction and social skills group, that the development of friendships and relationship for individuals with ASD can be facilitated. One parent asked for assistance to connect with other parents in the social groups. That is another potential area for research that can be explored. The research on Social Thinking® is still in its infancy. But extant research is promising, and additional research could be valuable.

Conclusions

Overall, the results of the study were promising, despite the study's mixed results. Positive findings were numerous: SBM rating scales, participants' SSIS scores, participant and parent social validity. The participants identified the social emotional chain reaction as a result of the SBM intervention. They successfully completed social behavior maps for two social situations that were taught during the intervention. The participants in the intervention group were able to generalize what they learned to a new social situation and correctly filled out a social behavior map for a novel social situation. The participants in the intervention group reported a statistically significant improvement on the social skills subtest of the SSIS. The participants in both groups reported enjoying the social group, learning something new, and had positive feedback to share. The parents in both groups gave positive feedback on the social validity measures. However, there was no observed increase in expected behaviors, and there was no observed decrease in unexpected behaviors. It is anticipated that with a larger sample size, longer duration, and maintaining the same activity for observation sessions that there would be an increase in expected behaviors and a decrease in unexpected behaviors. It is also possible that adding additional intervention components would increase the effectiveness of the intervention.

This study adds to the gap in research on social skills instruction in adolescents with ASD. It evaluated the effectiveness of SBM intervention, one component of the Social Thinking® approach utilizing a true experiment research design. This is the first study that utilized a true experimental group design in evaluating the effectiveness of SBM. There is limited research on social skills instruction in adolescence with ASD, and this study adds to the body of research.

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*****Included in review.

Tables

Table 1

Characteristics of Participants

Manualized Instructional Programs

Authors (year of publication)	N	Age Range (means)	Diagnoses	IQ	Setting *( )- indicates assumed region when not otherwise specified*
Barnhill, Cook, Tebbenkamp, and Myles (2002)	8 (7 M, 1 F)	12.9 – 17.9 (15.5)	AS, HFA or PDD-NOS [a]ADHD, ADD, ODD, IED	Not reported	University classroom and community *Large midwestern community (Missouri)*
Davis, Boon, Cihak, and Fore III (2010)	3 (M)	16- 17 (16.7)	AS [a]ADHD, SLI	101, 88, 65 (composite and full scale)	Resource room, conference room, general ed classroom
Herbrecht, Poustka, Birnkammer, Duketis, Schlitt, Schmotzer, and Bolte (2009)	17 (15 M, 2 F)	9.3-20.3 (14.7)	Autism, AS or PDD-NOS	≥ 70	Not specified; likely a clinic room *Frankfurt, Germany*
Hiller, Fish, Cloppert, and Beversdorf (2007)	13 (11 M, 2 F)	18-23 (19)	Autism, PDD-NOS, AS	[a]Verbal, performance and full scale ≥ 70	Spacious room *Large city in Midwest*
Ko, Miller, and Vernon (2019)	35 (24M,11 F)	IG: 13.25 CG: 13.74	ASD	IG: 99.06 CG: 94.05	Spacious room
Scattone, Tingstrom, and Wilczynski (2006)	3 (M)	8-13 (9.7)	ASD	67, 95, 95	Cafeteria, classroom, outdoors in area outside of classroom
Turner-Brown, Perry, Ditcher, Bodfish, and Penn (2008)	IG: 6 (5M,1 F) CG: 5 (5 M)	IG: 25 – 55 (42.5) CG: 27 -29 (28.8)	Members in both groups had HFA	Members in both groups Full scale ≥70	*(North Carolina)*
Webb, Miller, Pierce,	10 (M)	12.3 – 17.2 (14.8)	Met educational eligibility for an	Verbal ≥ 70	Rooms in a public agency building

Strawser, and Jones (2004)	ASD program	Performance ≥ 70	*(US, Nevada)*

Note. M = male; F = female; AS = Asperger's syndrome; HFA = high-functioning autism; PDD-NOS = pervasive developmental disorder, not otherwise specified; ASD = autism spectrum disorder; ADHD = attention deficit hyperactivity disorder; ADD = attention deficit disorder; ODD = oppositional defiant disorder; IED = intermittent explosive disorder; SLI = speech language impairment

[a] Some individuals had additional diagnoses

Nonmanualized Instructional Programs

Authors (year of publication)	N	Age range (means)	Diagnoses	IQ	Setting *( )- indicates assumed region when not otherwise specified*
Broderick, Caswell, Gregory, Marzolini, and Wilson (2002)	9 (M and F, numbers not specified)	12 – 15	AS	Not reported	Not specified, likely clinic and community *(UK)*
Howlin and Yates (1999)	10 (M)	19 – 44 (28.4)	Autism or AS	Nonverbal ≥70	Not specified, likely clinic room *London, UK*
Hughes, Golas, Cosgriff, Brigham, Edwards and Cashen (2011)	5 (3 M, 2 F)	16-21 (18.6)	ID *DS, speech impairment, autism, hearing impairment, Fragile X	42,66, 66, 72, not reported for one participant	Cafeteria, general education classroom
MacKay, Knott, and Dunlop (2007)	46 (38 M, 8 F)	6 – 16	AS, autism, PDD-NOS or ASD	Not reported	Not specified, likely clinic room and community *(UK)*
Nientimp and Cole (1992)	3 (2M, 1 F)	12 – 13.3 (12.7)	Autism or PDD-NOS	38, 32, unknown for one participant	Self-contained special education classroom in an integrated middle school *Eastern Pennsylvania*
Ozonoff and Miller (1995)	IG: 5 M CG: 4 M	IG: 13.5 – 14.0 (13.8) CG: 11.3 – 16.2 (13.6)	Autism or PDD-NOS	Full scale > 70	Clinic and community (*Utah, US)*
Rose and Anketell (2009)	31 (33 M, 9 F)	7 – 18 (11)	ASD	Not reported	Not specified, likely clinic room *Community trust area, UK*
Tse, Strulovitch, Tagalakis, Meng, and Fombonne (2007)	46 (28 M, 18 F)	13-18 (14.6)	AS or HFA	Not reported	Conference room at a psychiatry clinic and One trip to semiformal restaurant *(Montreal, Canada)*

Note. M = male; F = female; AS = Asperger's syndrome; HFA = high-functioning autism; PDD-NOS = pervasive developmental disorder, not otherwise specified; ASD = autism spectrum disorder; ID = intellectual

disability; DS = down syndrome; CG = control group; IG = intervention group; *some participants also had other diagnoses

Peer Mediated

Authors (year of publication)	N	Age range (means)	Diagnoses	IQ	Setting *( )- indicates assumed region when not otherwise specified*
Haring and Breen (1992)	2 (M)	P1 – 13 P2 – 13	P1 – autism P2 – MMR, severe language delay	Not reported	Special ed. Classroom Transition periods Lunch *(California)*
Hughes, Killian, and Fischer (1996)	4 (2 M, 2 F)	15-19 (16.25	MMR, one had additional diagnosis of autism	53, 40, 41, 47	Structured setting and natural settings for generalization probes
Krantz, Ramsland, and McClannahan (1989)	4 (M) *2-* peer prompter 3- target students	11 – 16 (13.8)	All four had autism	Not reported	Classrooms at Princeton Child Development Institute *NJ*
Morrison, Kamps, Garcia, and Parker (2001)	4 (3 M, 1 F)	10 – 13 (11.2)	[a]Autism	Not reported	Conference rooms, open areas between classrooms *Two suburban, two urban public schools*

Note. M = male; F = female; SMR = severe mental retardation; M-SMR = moderate to severe mental retardation; MMR = moderate mental retardation; P1 = participant 1; P2 = participant 2

[a] one participant had behaviors more consistent with AS

Scripts and Script Fading

Authors (Year of Publication)	N	Age Range (means)	Diagnoses	IQ	Setting *( )- indicate assumed region when not otherwise specified*
Argott, Townsend, Sturmey, & Poulson (2007)	3 (2 M, 1 F)	11 – 14 (12)	Autism	Not reported	Classroom, with four other peers and an additional instructor present, at a private school for children with autism *(US, New Jersey)*
Gaylord-Ross, Haring, Breen, & Pitts-Conway (1984)	Experiment 1 2 (M) Experiment 2 1 (M)	P1 – 20 P2 – 17 P3 – 18	P1 – autism, SMR P2- autism, M-SMR P3 – autism	P1: 35-45 P2: 30-55 P3: not reported	Special Ed. Classroom, courtyard *(US, California)*
Ross (2002)	3 (1 M, 2 F)	9 – 14 (11.6)	Autism	Not reported	Classrooms , dining room, & therapy room *(US, Florida)*
Stevenson, Krantz, & McClannahan (2000)	4 (M)	10 – 15 (12.5)	Autism	Not reported	Classroom *Princeton Child Development Institute, NJ*

Note. M = male; F = female

Technology

Authors (Year of Publication)	N	Age Range (means)	Diagnoses	IQ	Setting *( )- indicate assumed region when not otherwise specified*
Golan & Baron-Cohen (2006)	[a]Experiment 1 A: 19 (14 M, 5 F) B: 22 (17 M, 5 F) C: 24 (19 M, 5 F) Experiment 2 A: 13 (12 M, 1 F) B: 13 (10 M, 3 F) C: 13 (10 M, 3 F)	 17.5 – 48 (30.5) 17.5 – 52 (30.9) 15.5 – 51 (25.3) 17 – 50 (25.5) 17 – 42 (24.4) 17 – 51 (25.5)	AS or HFA	Verbal ≥ 70 Performance ≥ 70	Participants used the software at home Groups met at local support centers for individuals with ASC & a college for individuals with AS/HFA *(UK, Cambridge area)*
LeBlanc et al. (2003)	3 (M)	7 – 13 (9)	Autism	Not reported	Afterschool program or special education classroom
Mitchell, Parsons, & Leonard (2007)	6 (3 M, 3 F)	14.3 – 15.8 (15.4)	Autism, AS or ASD	V: 50% < 70 50% > 70 P: 17% < 70 83% > 70 FS: 33% < 70 67% > 70	Not specified, likely a clinic *(Nottingham, UK)*
Nikopoulos & Keenan (2003)	7 (6 M, 1 F)	9 – 15 (11)	Autism or AS [c]PMR, MR ADHD, epilepsy	Not reported	3 rooms at their school for children with developmental & learning disabilities *(Northern Ireland)*
State & Kern (2011)	1 (M)	14	AS	Not reported	school conference room, living room at home

Note. M = male; F = female; AS = Asperger's syndrome; HFA = high-functioning autism; ASD = autism spectrum disorder; PMR = profound mental retardation; MR = mental retardation; ADHD = attention deficit hyperactivity disorder; V = verbal IQ; P = performance IQ; FS = full-scale IQ; P1 = participant 1; P2 = participant 2

[a] A = intervention group; B = AS/HFA control group; C = typically developing control group

[c] Some individuals had additional diagnoses

Cognitive

Authors (year of publication)	N	Age range (means)	Diagnoses	IQ	Setting *( )- indicates assumed region when not otherwise specified*
Stichter, Herzog, Visovsky, Schmidt, Randolph, Schultz, and Gage (2010)	27 (M)	10.83-14.75 (12.57)	Autism, AS, PDD-NOS, ASD	reported mean FS: (103.81)	University-affiliated treatment center
Schmidt, Stichter, Lierheimer, McGhee, and O'Conner (2011)	6 (M)	12-13 (12.66)	Autism	FS: 84-129 (103.33)	Special education resource classroom
Schmidt and Stichter (2012)	3 (M)	13	Autism	FS: 84-106 (96.33)	Classroom for direct instruction Lunch for peer-mediated interventions (did generalization probes in math class)
Begeer, Gevers, Clifford, Verhoeve, Kat, Hoddenbach, and Boer (2011)	Tx: 19 (18M, 1F) C: 17 (15M, 2F)	Tx: 8.5-13.7 (10.3) C: 8.3-12.7 (10.3)	Autism, AS, PDD-NOS	Tx: FS: 79-133 (100.1) V: 68-123 (101.3) NV: 72-132 (98.4) C: FS: 82-126 (103.3) V: 89-130 (109.1) NV: 67-125 (96.6)	Not specified; likely a clinic room
Bauminger (2002)	15 (11M, 4 F)	8.08-17.33 (11.25)	Autism	Means reported FS: 81.36 V: 84.87 P: 88.20	Classroom with teacher and during recess and after school with peer (not specific location)
Lopata, Thomeer, Volker, and Nida (2006)	21 (M)	6-13 (10.05)	AS	Not reported, excluded if significant cognitive deficits	Not specified; likely classroom/clinic Weekly field trips
Lopata, Thomeer,	Tx1: 25 (23M, 2 F)	6-13 Tx1: (9.6)	AS PDD-	Means reported Tx1: 100.87	College campus (classroom, group

Volker, Nida, and Lee (2008)	Tx2: 29 (27M, 2F)	Tx2: (9.41)	NOS HFA	Tx2: 97.56	rooms, outdoor spaces) Weekly field trip
White, Ollendick, Albano, Oswald, Johnson, Southam-Gerow, Kim, and Scahill, (2013)	Tx: 11 (M) C: 12 (M)	Means Tx: 14.1 C: 15	Autism AS PDD-NOS	Means reported Tx: V:100.07 C: V: 94.07	University clinic
Lee, Lui, Kan, Mak, Cheung, Cheng, and Wong (2009)	4 M	14-15 (14.75)	Autism or autistic feature	Not reported	Not specified; likely a clinic in Hong Kong
Lee, Crooke, Lui, Kan, Mark, Hasselt, and Tong (2015)	39	12-15 (13.6)	ASD	98.0	After school in classroom

Note. M = male; F = female; AS = Asperger's syndrome; HFA = high-functioning autism; ASD = autism spectrum disorder; V = verbal IQ; P = performance IQ; FS = full-scale IQ; Tx = treatment group, C = control group

Table 2

Characteristics of Studies Reviewed

Manualized Instructional Programs

Reference	Design	G/M	S/N	Independent Variable	Dependent Variable	Assessment of DV
Barnhill et al. (2002)	One-group pretest-posttest design	G/M	S/N	Adapted lessons from *Teaching Your Child the Language of Social Success*	* Recognize emotion (happy, sad, angry, fearful) in facial expressions and in tone of voice * Overall rating of the program	* Formal assessment: diagnostic analysis of nonverbal accuracy 2 (DANVA2) * Informal survey to parents and participants
Davis et al. (2010)	Multiple probe across participants	G	S/N	Power cards	Percentage of time engaged in others-focused conversation (duration of conversational behavior/total length of session)	Direct observation Social validity survey
Herbrecht et al. (2009)	One-group, pretest-posttest design	M	S	Frankfurt social skills training (KNOTAKT): social skills group	* Autism characteristics * Social skills in group context * Psychosocial functioning * Participants behavior during warm up exercise * General social skills * Family burden * Social behavior in school setting	Experts * Diagnostic checklist for PDD (DCL) * Checklist for group behavior (CGB) * Global assessment of functioning (GAS) * Blind video rating of warm up portion of KNOTAKT Parents * Parent interview for autism – shortened (PIA-CV-mini) * Social competence scale (SKS) * Family burden questionnaire (FaBel) Teacher * Questionnaire for assessment of group behavior (FEG)
Hillier et al. (2007)	One-group, pretest-posttest design	None	S	Aspirations: social and vocational support group with no direct instruction	* Peer relations * Autism characteristics * Empathy * Frequency and type of contributions * Overall success of the program	* Self-reports: *Index of peer relations (IPR) – modified *Autism spectrum quotient (AQ) * Empathy quotient (EQ) – modified

						* Structured observations * Feedback session from parents and participants
Ko, Miller, and Vernon (2019)	Randomized control trial	G	S	Social tools and rules for teens (START)	* Questions asked * Positive facial expression * Mutual engagement	Direct observation
Scattone et al. (2006)	Multiple baseline design across participants	None	S/N	Social stories	Appropriate social interaction	* Percentage of intervals of appropriate social interaction * Social validity
Turner-Brown et al. (2008)	Nonequivalent control group, pretest-posttest design	None	S	Modifying the *Social cognition and interaction training* (SCIT) program: group-based cognitive behavioral intervention	* Emotion perception * Theory of mind (ToM) * Social communication * Social skill * Program satisfaction	* Face emotion identification test (FEIT) * Hinting task * Social communication skills questionnaire (SCSQ) (self-report) * Social skills performance assessment (SSPA) (performance) * Questionnaire
Webb et al. (2004)	One-group, pretest-posttest design	None	S	SCORE skills strategy: instruction in five social skills needed to work in cooperative groups	* Performance of five social skills * Knowledge of five social skills * Knowledge of when to use the social skill * Perceptions regarding working in small groups in school * Social behaviors (cooperation, assertion, responsibility, self-control) * Satisfaction with the intervention	* Skill knowledge survey * Situation discrimination test * Subject opinion survey * Social skills rating system (SSRS) * Subject and parent satisfaction questionnaires

G/M: assessed for generalization and maintenance
S/N: setting in structured (artificial) and/or natural environment

Non-Manualized Instructional Programs

Reference	Design	G/M	S/N	Independent Variable	Dependent Variable	Assessment of DV
Broderick et al. (2002)	One-group, pretest-posttest design	G	S/N	Social skills group, support in community youth groups	Social skills Self-esteem Attendance Level of support needed	Questionnaires
Howlin and Yates (1999)	One-group, pretest-posttest design	None	S	Social skills group: focus was understanding their social difficulties, conversational skills, independence	Amount of speech Type of utterances Social skills and overall functioning (checklist)	* Role-plays of two scenarios (party, work) * Checklist completed by parents and participants
Hughes et al. (2011)	Multiple baseline across settings and participants, with multiple probes	G/M	S/N	Communication book	* Social interaction * Participant and peer initiations and responses * Affect of the participant and peer during interaction * Quality of interaction * Reciprocity of interaction * Participants goals and if they reached them * Acceptability and effectiveness of intervention	* Direct observation (partial interval recording) * Interviewed participants preintervention and postintervention * Communication partners completed written questionnaire postintervention
MacKay et al. (2007)	One-group, pretest-posttest design	None	S/N	Groupwork intervention: focus on social and emotional perspective taking, conversational skills, friendship skills	* Social skills * Social competence * Improvement on three chosen social skills * If the group was helpful * Most helpful part of intervention * If anything changed * How experience was for the participant * Weakness of intervention	*Spence social skills questionnaire-parents (SSQ-P) * Social competence with peers questionnaire – parents (SCPQ) * Social skills questionnaire-pupils (SSQ-PU) * Social competence with peers questionnaire-pupils (SCPQ-PU) * Parent ratings on three social skills

						chosen * Follow-up interviews
Nientimp and Cole (1992)	Single subject: ABA withdrawl and AB design	G peer	S	Discrete trial – Constant time delay procedure (small group)	* Correct responses * Error responses * Echolalic responses * Prompted correct responses	Direct observation
Ozonoff and Miller (1995)	Nonequivalent control group, pretest-posttest design	None	S/N	Social skills group: focus on basic interactional skills, conversational skills, perspective taking, theory of mind	* Theory of mind (ToM) * Social behavior	* *Social skills rating system* (SSRS) Theory of Mind * M&Ms false belief task * Second-order belief attribution task * Overcoat story * Prisoner story
Rose and Anketell (2009)	One-group, pretest-posttest design	M	S	Social skills group	* Is social group beneficial? * Social-communication skills * Cost analysis of group versus individualized instruction	* Parents focus group * Questionnaires (parents) * Participants' evaluations (each session) * Facilitators' informal observation
Tse et al. (2007)	One-group, pretest-posttest design	none	S/N	Social skills group emphasis on learning through role play	* Social competence * Problem behavior * If they liked the group and felt improved on learned skills	* *Social responsiveness scale* (SRS) * Aberrant behavior checklist (ABC) * Nisonger child behavior rating form (N-CBRF) * Feedback survey (participants) * Parent survey

G/M: assessed for generalization and maintenance
S/N: setting in structured (artificial) and/or natural environment

Peer Mediated Interventions

Reference	Design	G/M	S/N	Independent Variable	Dependent Variable	Assessment of DV
Haring and Breen (1992)	Multiple baseline design across participants	G/M	S/N	Peer support network	* Frequency of social interaction * Frequency of appropriate social responding * Quality of the interaction * Number of occasions interactions occurred outside of school * Satisfaction with program	* Direct observation (peer data sheets) * Informal and formal feedback from students and peers
Hughes et al. (1996)	Multiple baseline design across students	G/M	S/N	Peer instructors	* Participant initiating * Partner responding * Eye gaze * Self-instruction	* Direct observation (partial interval recording) * Interviews * Questionnaires * Behavioral ratings * Social validity
Krantz et al. (1989)	Multiple baseline design across students	G/M	S	Peer prompter with ASD	Sports conversation	Direct observation (time-sampling procedure)
Morrison et al. (2001)	Multiple baseline design across skills with counterbalanced reversal design	G/M	S/N	Peer mediation Self- and peer-monitoring	* Initiations * Responses * Social interaction * Inappropriate behaviors * Requesting * Commenting * Sharing	Direct observation Peer- and self-monitoring

G/M: assessed for generalization and maintenance (questionnaires do not count)
S/N: setting in structured (artificial) and/or natural environment

Scripts and Script Fading

Reference	Design	G/M	S/N	Independent Variable	Dependent Variable	Assessment of DV
Argott et al. (2007)	Multiple-baseline across subjects with generalization probes	G/M	S	* Written and audio scripts * Script-fading	* Scripted empathetic responses * Unscripted empathetic response	* Direct observation
Gaylord-Ross et al. (1984)	Multiple baseline design across objects * For both experiments	G/M	S/N	* Training scripts * Task analysis	* Frequency of social initiation * Duration of social interaction * Who peer was, type of interaction (object centered versus nonobject centered)	* Direct observation
Ross (2002)	Reversal design (ABA)	G	S/N	* Functional communication training with scripts * Modified functional analysis * Token economy	* Responses to questions * Statements * Faulty responses * Conversational units	* Audio-taped sessions (two participants) * Video tape sessions (one participant)
Stevenson et al. (2000)	Multiple probe design	G/M	S	* Audio scripts * Script fading	Interactions * Scripted 1 * Scripted 2 * Unscripted * Noninteraction	Direct observation

G/M: assessed for generalization and maintenance
S/N: setting in structured (artificial) and/or natural environment

Technology

Reference	Design	G/M	S/N	Independent Variable	Dependent Variable	Assessment of DV
Golan and Baron-Cohen (2006)	Nonequivalent control group, pretest-posttest (two studies)	G	S	STUDY 1 *Mind Reading*: computer program STUDY 2 *Mind Reading* + attending small group	Recognizing complex emotions in faces and voices in three levels of generalization (close, feature-based distant, holistic distant)	Close generalization * Cambridge mindreading (CAM) Face-voice battery (from the Mind Reading program) Feature-based distant * Reading the mind in the eyes task (revised, adult version) * Reading the mind in the voice task (revised) holistic distant *Reading the mind in films
LeBlanc et al. (2003)	Multiple baseline across tasks	G/M	S	Video modeling Reinforcement	Perspective taking	M&M's task Hide and seek task Sally-Anne (preintervention postintervention for generalization)
Mitchell et al. (2007)	Counter-balanced group design, without random assignment	G	S	Virtual environments	Social understanding * Social judgments * Social reasoning/explanations	Video clips of real café and bus and asking where they would sit and why
Nikopoulos and Keenan (2003)	Multiple treatment and A-B	G/M	S	Video modeling and video self-modeling	Social initiation Appropriate play	Direct observation
State and Kern (2011)	Single subject: Reversal (ABCBC) with replication across game partners	G/M	S	Video feedback and in vivo self-monitoring	* Inappropriate social interactions * Inappropriate noises * Appropriate social interactions * Social validity	Direct observation (collected via videotape) of 15-minute structured activities Self-monitored school intervention rating form (SIRF)

G/M: assessed for generalization and maintenance
S/N: setting in structured (artificial) and/or natural environment

Cognitive

Reference	Design	G/M	S/N	Independent Variable	Dependent Variable	Assessment of DV
Stichter, Herzog, Visovsky, Schmidt, Randolph, Schultz, and Gage (2010)	Group (OG)	G	S	Social competence intervention (SCI) -metacognitive strategies, self-monitoring and self-regulation, exposure and response to situations	Social abilities theory of mind emotion recognition Executive functioning	*Social responsiveness scale* (SRS) ToM (1st and 2nd order) Faux pas stories Diagnostic analysis of nonverbal accuracy-2, child facial expressions (DANVA-2-CF) Reading the mind in eyes test Behavior rating inventory of executive function (BRIEF) Test of problem solving-2 (TOPS-3)
Schmidt, Stichter, Lierheimer, McGhee, and O'Conner (2011)	Group (OG)	G	S	Social competence intervention (SCI)	Social abilities theory of mind emotion recognition executive functioning	Direct observation *Social responsiveness scale* (SRS) ToM (1st and 2nd order) Faux pas stories Diagnostic analysis of nonverbal accuracy-2, child facial expressions (DANVA-2-CF) Reading the mind in eyes test behavior rating inventory of executive function (BRIEF)
Schmidt and Stichter (2012)	Single subject: multiple treatments design (ABCDCD)	G	S/N	Social competence intervention (SCI)-Adolescents peer-mediated strategies	Appropriate and inappropriate initiations, responses, and continuations directed toward peers	Direct observation
Begeer, Gevers, Clifford, Verhoeve, Kat,	Group Independent groups design	G	S	The theory of mind training (manualized treatment program)	Theory of mind Emotional awareness empathy	Theory of mind test Levels of emotional awareness scale for children (LEAS-C)

Hoddenbach, and Boer (2011)						Index of empathy for children and adolescents Children's social behavior questionnaire (CSBQ): parents
Bauminger (2002)	Group (OG)	G	S/N	Interpersonal Problem-solving model (adapted) I found a solution (adapted) Peer-mediated	Social cognition Emotional understanding Social functioning	Direct observation The problem-solving measure (PSM) The emotion inventory The social skills rating scale (SSRS) Teachers
Lopata, Thomeer, Volker, Nida (2006)	Group (NCG)	G	S/N	Skillstreaming program (adapted) -Social skills instruction -Face affect recognition -Interest expansion	Social skills Adaptability Atypicality	*Behavior Assessment System for Children* (BASC)
Lopata, Thomeer, Volker, Nida, and Lee (2008)	Group (independent groups design) *(two different tx groups, random assignment)*	G	S/N	Skillstreaming program (adapted)	Social skills Withdrawl Atypicality Behavioral symptoms Adaptive skills Emotion identification	*Behavior Assessment System for Children* (BASC) Skillstreaming survey (Ss)- adapted Diagnostic analysis of nonverbal accuracy2 (DANVA2) Parent satisfaction survey
White, Ollendick, Albano, Oswald, Johnson, Southam-Gerow, Kim, and Scahill, (2013)	Group (independent groups design)	G	S	Multimodal anxiety and social skills intervention (MASSI) -CBT	Anxiety symptoms Social competency Global functioning	*Social responsiveness scale* (SRS): Child and adolescent ASD symptom Inventory- 4Anxiety scale (CASI-Anx) Pediatric anxiety rating scale (PARS) Clinical global impressions improvement scale (CGI-I) Developmental disabled children's global assessment scale (DD-CGAS)
Lee, Lui, Kan, Mak, Cheung, Cheng, and Wong (2009)	Case study	G	S	Social thinking	Initiation Listening Abstracting information Understanding	Social Thinking Rating Scale (STRS) Participant and Parent

					Perspective Gestalt Humor	Interviews
Lee, Crooke, Lui, Kan, Mark, Hasselt, and Tong (2015)	Group (OG)	G	S	Social Thinking	Initiation Listening Abstracting information Understanding perspective Gestalt Humor	*Social Thinking-ILAUGH Scale*

G/M: assessed for generalization and maintenance
S/N: setting in structured (artificial) and/or natural environment
OG: one-group, pretest-posttest design
NCG: nonequivalent control group, pretest-posttest design

Table 3

Characteristics of Participants at Preassessment

	Intervention (*n* = 12)		Treatment as usual (*n* = 10)	
	n or Mean (SD)	%	*n* or Mean (SD)	%
Age (years: mean and *SD*)	15.08 (1.25)		15.4 (1.11)	
Gender				
Female	6	50%	4	40%
Male	6	50%	6	60%
Race				
White	8	66.7%	8	80%
Hispanic	1	8.3%	0	0%
White/Black	1	8.3%	0	0%
White/Asian	2	16.7%	1	10%
White/Hispanic	0	0%	1	10%
Coexisting language disorder	4	33.3%	3	30%
Coexisting mental health diagnosis	10	83.3%	6	60%
Coexisting medical diagnosis	2	16.7%	4	40%
Parents highest educational level				
High school	0	0%	0	0%
Some college	2	16.7%	1	10%
Associates	1	8.3%	1	10%
Bachelor's	5	41.7%	0	0%
Master's	1	8.3%	6	60%
Ph.D./doctorate	3	25%	2	20%
Number of adults in household				
1 adult	1	8.3%	0	0%
2 adults	8	66.7%	9	90%
3 or more adults	3	25%	1	10%
Annual household income				
$30,000-$39,999	1	8.3%	1	10%
$40,000-$49,999	2	16.7%	0	0%
$70,000-$79,999	1	8.3%	1	10%
$80,000-$89,999	1	8.3%	0	0%
$90,000-$99,999	2	16.7%	0	0%
$100,000-150,000	2	16.7%	1	10%
$150,000 and more	2	16.7%	5	50%

Prefer not to answer	1	8.3%	2	20%
Full scale IQ (Mean and SD)	92.33 (20.87)		96.9 (18.19)	

Table 4

Means, Standard Deviations, and Two-Way ANOVA Statistics for Social Behavior Mapping Rating Scale Scores and SSIS Participants and Parents Scores

Variable	Intervention (n = 12)		Treatment as usual (n = 10)		ANOVA			
	M	SD	M	SD	Effect	F ratio	df	η^2
SBM								
Preintervention	10.92	11.75	16	9.90	G	6.641*	1,20	.249
Postintervention	34.5	2.47	11.50	10.78	T	22.632**	1,20	.531
					GxT	49.012**	1,20	.710
SSIS-participant								
Preintervention	85.25	14.913	95.60	19.676	G	.584	1,20	.028
Postintervention	96.00	13.954	96.20	19.217	T	6.996*	1,20	.259
					GxT	5.595*	1,20	.219
SSIS-parent								
Preintervention	82.83	18.54	80.60	12.23	G	.878	1,20	.042
Postintervention	89.58	15.68	80.40	11.49	T	2.538	1,20	.113
					GxT	2.858	1,20	.125

ANOVA = analysis of variance, G = Group, T = Time, *$p < .05$, **$p < .01$

Table 5

Observed Expected Behaviors

Variable	Intervention (n = 12)		Treatment as usual (n = 10)		ANOVA			
	M	*SD*	*M*	*SD*	Effect	*F* ratio	*df*	η^2
Total Expected Behaviors (verbal & nonverbal) - During Snack/dinner and Games/Activities/Sensory Gym								
Preintervention	159.92	55.58	113.10	70.28	G	1.059	1,20	.050
Postintervention	124.67	58.83	118.30	53.43	T	9.089*	2,19	.489
Generalization	98.92	42.82	83.50	68.67	GxT	2.143	2,19	.184
Expected Verbal Behaviors - During Snack/Dinner								
Preintervention	30.83	13.19	29.20	21.06	G	.012	1,20	.001
Postintervention	24.58	13.04	31.40	20.93	T	2.885	2,19	.233
Generalization	26.83	12.44	19.70	16.74	GxT	3.806*	2,19	.286
Expected Nonverbal Behaviors - During Snack/Dinner								
Preintervention	35.50	15.99	27.50	17.73	G	1.177	1,20	.056
Postintervention	30.00	17.74	25.40	15.74	T	1.672	2,19	.150
Generalization	28.67	15.16	21.30	17.02	GxT	.284	2,19	.029
Expected Verbal Behaviors - During Games/Activities/Sensory Gym								
Preintervention	43.33	17.59	24.30	20.80	G	.924	1,20	.044
Postintervention	35.75	19.20	30.60	16.75	T	3.485	2,19	.268
Generalization	21.08	15.20	26.00	26.02	GxT	4.811*	2,19	.336
Expected Nonverbal Behaviors - During Games/Activities/Sensory Gym								
Preintervention	50.25	21.24	32.10	22.97	G	1.976	1,20	.090
Postintervention	34.33	23.59	30.90	11.86	T	12.937**	2,19	.577

Generalization	22.33	12.55	16.5	14.14	GxT	1.842	2,19	.162
Initiations								
Preintervention	7.58	6.26	8.50	9.05	G	.108	1,20	.005
Postintervention	9.08	6.78	11.00	10.78	T	1.708	2,19	.152
Generalization	7.75	7.53	8.20	9.94	GxT	.186	2,19	.019

ANOVA = analysis of variance, G = Group, T = Time, *$p < .05$, **$p < .01$

Table 6

Observed Unexpected Behaviors

Variable	Intervention (*n* = 12)		Treatment as usual (*n* = 10)		ANOVA			
	M	*SD*	*M*	*SD*	Effect	*F* ratio	*df*	η^2
Total Unexpected Behaviors (verbal and nonverbal) - During Snack/Dinner and Games/Activities/Sensory Gym								
Preintervention	34.25	26.59	40.10	28.90	G	.501	1,20	.024
Postintervention	28.67	31.98	32.90	14.72	T	7.274*	2,19	.434
Generalization	15.92	14.79	24.10	8.850	GxT	.130	2,19	.014
Unexpected Verbal Behaviors - During Snack/Dinner								
Preintervention	1.00	2.49	1.30	3.43	G	.078	1,20	.004
Postintervention	2.92	7.32	0.80	1.62	T	.383	2,19	.039
Generalization	0.42	0.79	1.30	4.11	GxT	.839	2,19	.081
Unexpected Nonverbal Behaviors - During Snack/Dinner								
Preintervention	18.58	13.47	15.90	11.82	G	.398	1,20	.020
Postintervention	12.50	12.38	19.90	11.15	T	2.862	2,19	.231
Generalization	11.42	11.34	15.10	6.35	GxT	3.504	2,19	.269
Unexpected Verbal Behaviors - During Games/Activities/Sensory Gym								
Preintervention	2.08	7.22	0.50	1.27	G	.650	1,20	.031
Postintervention	1.50	2.20	0.50	0.71	T	3.256	2,19	.255
Generalization	0.50	1.73	0.30	0.67	GxT	1.511	2,19	.137
Unexpected Nonverbal Behaviors - During Games/Activities/Sensory Gym								
Preintervention	12.58	13.47	22.40	20.00	G	1.20	1,20	.057
Postintervention	11.75	14.00	11.70	6.58	T	7.868*	2,19	.453

Generalization	3.58	3.99	7.40	4.70	GxT	1.971	2,19	.172

ANOVA = analysis of variance, G = Group, T = Time, *$p < .05$, **$p < .01$

Appendix A

An Overview of the Intervention: Week-by-Week

This is the format for each of the group sessions

SBM Intervention Group	Treatment as Usual Group
5 min: Check-in 20 min: Instructional period on SBM 10 min: Snack 20 min: Game/activity 5 min: Wrap-up	5 min: Check-in 20 min: Snack 30 min: Game/activity 5 min: Wrap-up

This is what the intervention consisted of:

	SBM Intervention Group- Instructional Period consisted of	**Treatment as Usual Group**
Week 1 Preaassess	20 min: Introductions and ice breaker activity 15 min: Snack (10 min preassessment observation) 20 min: Games/activity (10 min preassess observe) 5min: Wrap-up	20 min: Introductions and ice breaker activity 15 min: Snack (10 min preassessment observation) 20 min: Games/activity (10 min preassess observe) 5 min: Wrap-up
	Instructional Period Consisted of:	
Week 2	Introduction into SBM and introduce vocabulary Social fortune/social fate: Someone you like (or are friends with) does something different with their appearance	5 min: Check-in 20 min: Snack 30 min: Game/activity 5 min: Wrap-up
Week 3	Complete as a group *SBM 1: Eating snacks with peers with adult present* (they write it down on their own copy) ** Review SBM1 prior to snack*	5 min: Check-in 20 min: Snack 30 min: Game/activity 5 min: Wrap-up
Week 4	Complete as a group *SBM 2: Participating in games activities with peers with an adult present* (they write it down on their own copy) ** Review SBM 1 and 2 prior to snack and games*	5 min: Check-in 20 min: Snack 30 min: Game/activity 5 min: Wrap-up
Week 5	Social fortune/social fate: Figuring out what to say to others *Review SBM 1 and 2* ** Review SBM 1 and 2 prior to snack & games*	5 min: Check-in 20 min: Snack 30 min: Game/activity 5 min: Wrap-up
Week 6	Social fortune/social fate: break time *Review SBM 1 and 2* **review SBM 1 and 2 prior to snack and*	5 min: Check-in 20 min: Snack 30 min: Game/activity

	games	5 min: Wrap-up
Week 7	Social fortune/social fate: sharing ideas opinions *Review SBM 1 and 2*	5 min: Check-in 20 min: Snack 30 min: Game/activity 5 min: Wrap-up
Week 8 (1.25 hrs) Post-Assess	10 min: Check-in 15 min: Snack (10 min postassessment observe) 20 min: Games/activity (10 min postassess observe) 30 min: complete post assessments (SSIS, 3 SBM, social validity questionnaire)	10 min: Check-in 15 min: Snack (10 min postassessment observation) 20 min: Games/activity (10 min postassess observation) 30 min: Complete postassessments (SSIS, 3 SBM, social validity questionnaire)
Week 9	Celebration: Generalization 10 min: Greetings and small talk 30 min: Meal celebration (10 min observe) 20 min: Free time sensory gym (10 min observe)	Celebration: Generalization 10 min: Greetings and small talk 30 min: Meal celebration (10 min observe) 20 min: Free time sensory gym (10 min observe)

Appendix B

Ten Steps of Social Behavior Mapping

PRIME: Simple statement to introduce the map

- For example: "This is a sort of road map (or map or visual map) that shows what people do and how others might think, feel, and respond (or act or react). It's called a social behavior map"
- Language should reflect the developmental level of the individual
- Use words or pictures to fill out the columns, but students should have language and cognitive skills strong enough to talk about thinking and to think about language, emotions, and behaviors

STEP 1: Social behavior mapping always starts by defining the situation and the people = Context

- Situations can be thought of as a time when people have a goal-shared agreement: For example: lining up to leave the classroom
- Situations are never unexpected behaviors

STEP 2: Next, ask the client/student to generate a behavior that would be unexpected for the situation and the people. (You can write it for them or they can write it)

- Remember, this is not about his or her behaviors at this point

TIP guide for helping to generate behaviors

Consider these for generating expected/unexpected behaviors:

What a person says	What a person does with their eyes or face
A person's actions	What a person does with their body (hands/feet)

Unexpected behavior(s)

- Reiterate or describe the behavior in a brief and instructive manner, regardless of how the person may originally state it (example, if they say a bunch of swear words, you would say that is a good example of what is unexpected when…., I'm going to put "swearing".
- Be careful to avoid imposing judgment, assuming intention, or shaming when reiterating their response.
- Remember, this is a social emotional learning tool and not a behavioral adjustment system!

For example: student says, "Run to the moon and back"
Your response: "Wander away from the group"

List no more than four unexpected behaviors (in single words or phrases), no paragraphs

STEP 3: Next, ask to generate a behavior that would be expected for the situation and the people

- May have to go back to the TIP box

- Or, you can refer to the bottom of the map where the unexpected behaviors are listed and guide the client by having them think about the opposite

So, if running or wandering away from the group is unexpected, when it is line-up time and the teacher is there, then what might be expected?
** Avoid negatives such as no, don't, can't, etc. Restate in positive language if needed.
List no more than four expected behaviors

STEP 4: Move across the expected half of the map to show the social emotional chain reaction

- When (situation) with (people), if someone (expected 1, 2, 3, and 4), then how might others feel (or think)?
- List three or four emotions (feelings)
- They use feelings/emotions interchangeably even though we know there is a difference. One is biological, neurological, it happens within; the other is the words we use. So, feelings just happen, and emotions are the words we use to label those feelings. The problem is that in schools, people often say how are you feeling, versus what emotion are you having now. Decided to stick with term feeling that kids most familiar with
- When introducing this, it is a good opportunity to teach emotional vocabulary
- There is never a one-to-one correspondence; they are vertical lists

STEP 5:

- So if a person is (feeling 1, 2, 3), then how might other people act or react?
- List three or four actions or reactions

STEP 6:

- So if someone (acts/reacts with 1, 2, 3), then how might others feel?
- List three or four emotions (feelings)

STEP 7:

- Move across the unexpectted half of the map
- When (situation) with (people), if someone (Unexpected 1, 2, 3, 4), then how might others feel (or think)?
- List three or four emotions (feelings)

Continue 8 and 9 in the same manner as before

STEP 10:

- Finally, circle the chain reaction, and talk through the map
- Circle only one behavior on each half.
- The circles do not need to line up (no 1:1 correlation)

Circle and talk through the map: expected

In (situation) with (people) and (behavior) then (emotion), which might mean (action) and then others might feel (emotion)

Example: neutral, they just may have a tiny thought; we don't always have big emotions around things

Circle and talk through the map: unexpected
In (situation) with (people) and (behavior) then (emotion), which might mean (action) and then others might feel (emotion)

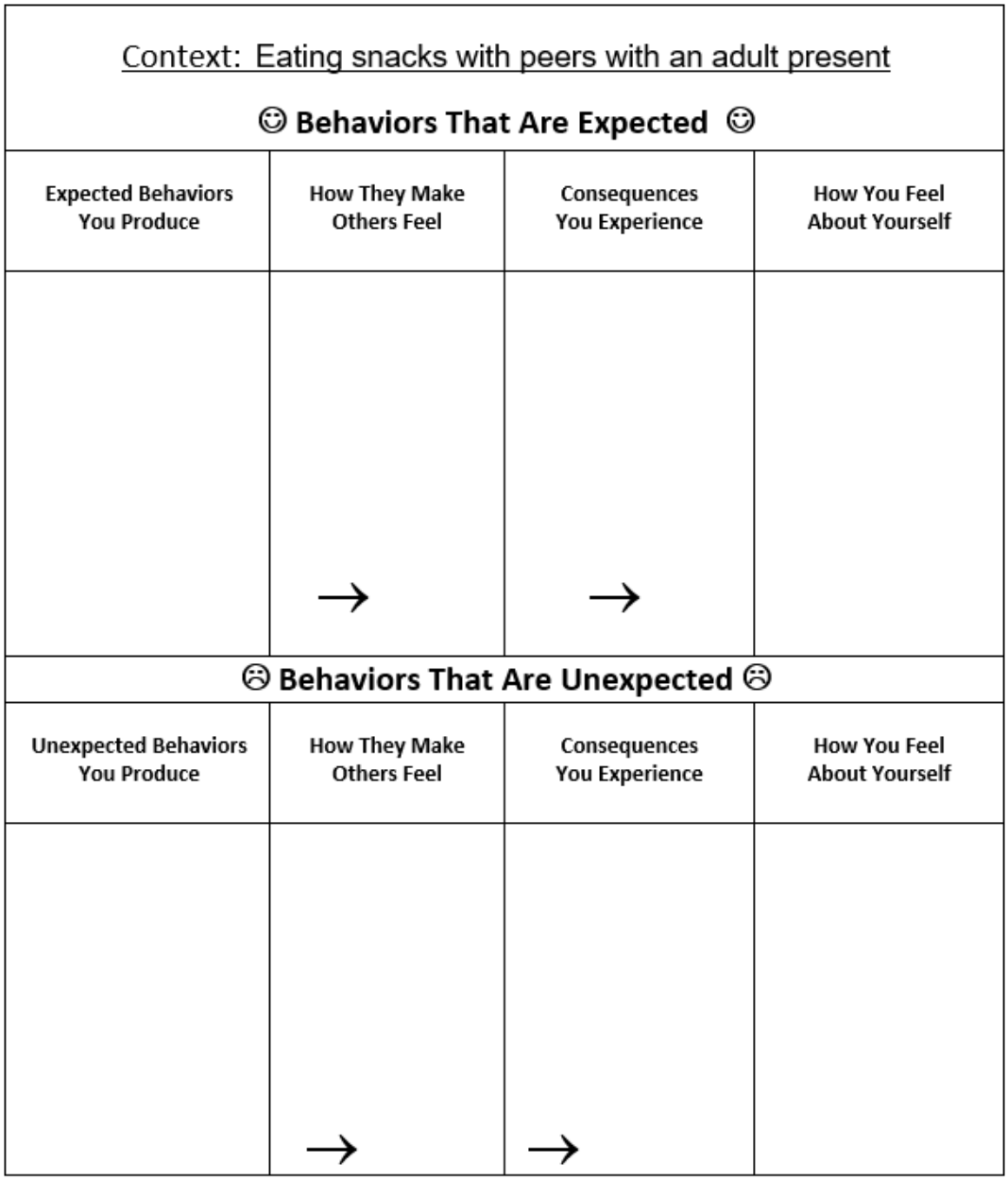
Reminders and tips

- Teach social observation of others first or from the child, teen, or adult's perspective
- Be sure to talk about the importance of situation and people to understand the unspoken social agreements. If you don't know the situation or people, you can't use a social behavior map; it doesn't work because you are trying to discover the hidden rules based on the situation and people
- Never start by using SBM as a behavior control system
- Keep it positive on the expected side
- Use common sense and teaching savvy on timing and person

Winner, M. G. (2008). *Social Behavior Mapping.* Think Social Publishing.

Appendix C

Sample Social Behavior Map



Winner, M. G. (2008). *Social Behavior Mapping.* Think Social Publishing.

Appendix D

Social Behavior Map Scoring Rubric

Participant ID: _____

Does not correctly identify any expected or unexpected behaviors, including leaving the column(s) blank 0	Correctly identifies at least one expected or unexpected behavior. There can be incorrect responses. 1	Correctly identifies one expected and one unexpected behavior. There can be no incorrect responses. 2	Able to correctly identify both the expected and unexpected behaviors (minimum of two in each condition). There can be no incorrect responses. 3
Does not correctly identify how they make others feel in either condition, including leaving the column blank 0	Correctly identifies at least one emotion in either condition. There can be incorrect responses. 1	Correctly identifies one emotion in each condition. There can be no incorrect responses. 2	Able to correctly identify how they make others feel in both conditions (minimum of two in each condition). There can be no incorrect responses. 3
Does not correctly identify any consequences in either condition, including leaving the column blank 0	Correctly identifies at least one consequence in either condition. There can be incorrect responses. 1	Correctly identifies one consequence in each condition. There can be no incorrect responses. 2	Able to correctly identify potential consequences (minimum of two in each condition). There can be no incorrect responses. 3
Does not correctly identify how they feel in either condition, including leaving the column blank 0	Correctly identifies at least one emotion they would feel in either condition. There can be incorrect responses. 1	Correctly identifies one emotion in each condition. There can be no incorrect responses. 2	Able to correctly identify how they would feel (minimum of two responses in each condition). There can be no incorrect responses. 3

Total score:_____(out of 12 possible)

Appendix E

Treatment Fidelity Observation Checklist

Treatment Fidelity Checklist
Steps of Social Behavior Mapping Instruction
(to be filled out by research assistant during observations for treatment fidelity)

Date: _____
Instructions: Place a check mark if you observed the research student doing the following:

_____PRIME: Simple statement to introduce the map

- For example: "This is a sort of road map (or map or visual map) that shows what people do and how others might think, feel, and respond (or act or react). It's called a social behavior map"
- Language should reflect the developmental level of the individual
- Use words or pictures to fill out the columns, but students should have language and cognitive skills strong enough to talk about thinking and think about language, emotions, and behaviors.

_____STEP 1: Defining the situation and the people = Context

_____STEP 2: Asked the participants to generate a behavior that would be unexpected for the situation and the people.

_____STEP 3: Asked the participants to generate a behavior that would be expected for the situation and the people.

_____STEP 4: Move across the expected half of the map to show the social emotional chain reaction and how the expected behaviors produced might make others feel

- When (situation) with (people), if someone (expected 1, 2, 3, and 4), then how might others feel (or think)?
- List three or four feelings

_____STEP 5: Move to the consequences a person might experience of the SBM

- So if a person is (feeling 1, 2, 3), then how might other people act or react?
- List three or four actions or reactions

_____STEP 6: Move to how a person might feel about themselves of the SBM

- So if someone (acts/reacts with 1, 2, 3), then how might others feel?
- List 3-4 emotions (feelings)

_____STEP 7: Move across the unexpected half of the map

- When (situation) with (people), if someone (Unexpected 1, 2, 3, 4), then how might others feel (or think)?

- List three or four emotions (feelings)

_____STEP 8: Move to the consequences a person might experience of the SBM

- So if a person is (feeling 1, 2, 3), then how might other people act or react?
- List three or four actions or reactions

_____STEP 9: Move to how a person might feel about themselves of the SBM

- So if someone (acts/reacts with 1, 2, 3), then how might others feel?
- List three or four emotions (feelings)

_____STEP 10:

- Finally, circle the chain reaction and talk through the map
- Circle only one behavior on each half
- The circle does not need to line up (no 1:1 correlation)

_____Circle and talk through the map: expected
In (situation) with (people) and (behavior) then (emotion), which might mean (action) and then others might feel (emotion)

_____Circle and talk through the map: unexpected
In (situation) with (people) and (behavior) then (emotion), which might mean (action) and then others might feel (emotion)

*Winner, M. G. (2008). *Social Behavior Mapping.* Think Social Publishing.

Appendix F

Definitions of Expected and Unexpected Behaviors

Expected-verbal	Any instance of <u>verbal output</u> that involves a comment or question in response to another person in a social exchange or as an attempt to sustain a topic or initiate a social exchange	
	Initiations	1) *Initiations* are defined as any comment or question that serves to engage another individual(s) in a novel social exchange. Questions/comments in this category are those based on: • Visible cues (i.e., t-shirt, book) (e.g., I like your shirt, what book are you reading) • Prior knowledge about the conversational partner (e.g., Aren't you the guy who likes to play Minecraft?) • Personal interest comment or question (e.g., Have you ever been skiing?).
	Maintenance	2) *On-topic remarks* are defined as any remark that adds to the current topic by adding a topic-related comment. 3) *One-word comments* are defined as single-word responses or utterances that serve as an attempt to sustain the interaction (e.g., Yeah, uh-huh, OK, yep, oh, giggling at an expected time)
Expected-nonverbal	Any instance of a <u>nonverbal behavior</u> that is clearly an attempt to sustain a social exchange.	
	Listening with the eyes	4) Listening with the eyes is defined as looking in the direction of the speaker's head (with or without orienting one's body) or looking at an object or person that was the topic of the social exchange.
	Facial expressions	5) Facial expressions are defined as smiling or making a facial expression that is expected given the context. (i.e., social smile)
	Misc.	6) Misc. is defined as orienting one's body to the listener, and gestures are defined as arm and hand movements that are expected given the context. (i.e., descriptive or emphatic gestures)
Unexpected verbal	Any instance of <u>verbal output</u> that involves negative comments about people, places, and/or things that are easily interpreted by any listener as offensive, rude, odd, or inappropriate to the environment.	
	Verbal	1) *"Rude" remarks* are defined as comments that could be readily identified as offensive to a peer group or could result in hurt feelings. Examples: Name-calling (e.g., stupid), negative remarks directed to someone in the group (e.g., You suck) or about possession and or interest of others (e.g., If you like Minecraft, you're stupid).

		2) *Perseverative topics* are defined as any topic that is brought up more than three times within the session and are related to a subject's personal interest but are not shared by others. (i.e., talking about tanks when no one else shares an interest, or interest has waned). 3) *Off-topic comments* are defined as any comment that is in no way related to the topic of the exchange or attempts to shift the topic without providing a shift or bridge to the new topic. 4) *Yelling/screeching/screaming* during a social exchange or interaction. 5) *Talking to self* is defined as any verbalization that occurs without a clear listener 6) *Sound effects/noises* are defined as any sound/noise that is unrelated to the topic at hand and do not contain a clear linguistic purpose. 7) *Other* is defined as any other unexpected verbal behavior not otherwise defined but is clearly unexpected. This includes not verbally answering when a verbal response is expected (i.e., not responding to a direct question).
	Nonverbal	8) *Arm, leg, head, body movements* are defined as any movement(s) of the arms, legs, and head that is clearly atypical. This includes a 90-degree head turn from the reference point (i.e., speaker) during a social exchange 9) *Atypical eye contact* is defined as any prolonged or noticeable brief/absent eye contact during a social exchange 10) *Atypical object use* is defined as using an object in a manner that was not intended and resulted in a distraction during a social exchange. 11) *Misc. nonverbal* includes (but is not limited to) the following nonverbal behaviors: a. Closing eyes during a social exchange b. Putting head down on the table during a social exchange c. Repetitive touching/poking/tapping others without clear intention of gaining attention

*****_The definitions were largely taken from the definitions used in Crooke et al.'s 2008 brief report. Only minor modifications were made_.

Only the frequency of expected and unexpected behaviors will be coded. Duration will not be coded. Unintelligible utterance and/or nonverbal behaviors that were not clearly captured on video will be excluded. Nonverbal behavior will be coded as a frequency of one for the duration of the behavior, regardless of the time spent engaging in that behavior. For instance,

when someone looks at a peer and initiates a question, that will be coded as one *initiation* and one *listening with the eyes* because both a verbal and nonverbal behavior are observed. If they disengage from looking at the peer but later reengage in looking at the peer as part of the social exchange, that will be coded as a separate occurrence for a total of two *listening with the eyes*. It is important to note that only when expected nonverbal behaviors are demonstrated as part of a social exchange or attempt to initiate an interaction will it be coded. Looking across the room at peers as part of social observation will not be coded as *listening with the eyes.*

Appendix G

Direct Observation Data Collection Sheet

Participant ID: _____ Video ID: _____

Observation Data Collection

Expected- verbal

Initiations	
Maintenance: on-topic remarks	
Maintenance: one-word comments or utterances	

Expected- nonverbal

Listening with the eyes	
Facial expressions	
Misc. (body, gestures)	

Unexpected- verbal

Rude remarks	
Perseverative topics	
Off-topic comments	
Yelling/screeching/screaming	
Talking to self	
Sound effects/noises	
Other	

Unexpected- Nonverbal

Arm, leg, head, body movements	
Atypical eye contact	
Atypical object use	
Misc. Nonverbal	

Appendix H

Demographic Questionnaire

Participant ID: _____

Age:_____

Sex assigned at birth:

____male ____female ____intersex ____prefer not to disclose

Race:

____White ____Asian

____Black or African American ____Native Hawaiian or Other Pacific Islander

____American Indian or Alaska Native ____Other: _____

Medical Diagnosis (including mental health diagnosis):

_____

Parent's highest level of educational attainment:

____Less than high school ____Bachelor's degree

____High school completion/GED ____Master's degree

____Some college, no degree ____Doctorate/Ph.D.

____Associate's degree ____Other: _____

Number of people in household: _____ Adults: _____ Children: _____

What is the total annual household income?

____Less than $10,000 ____$50,000 to $59,999 ____$100,000 to $149,000

____$10,000 to $19,999 ____$60,000 to $69,999 ____$150,000 or more

____$20,000 to $29,999 ____$70,000 to $79,000 ____ Prefer not to answer

____$30,000 to $39,999 ____$80,000 to $89,999

____$40,000 to $49,999 ____$90,000 to 99,999

Appendix I

Social Validity Questions—Parent

1) Have you seen any increase in your child's expected behaviors in other settings? If so, please provide an example.

_____
_____
_____
_____

2) Have you seen any decrease in your child's unexpected behaviors in other settings? If so, please provide an example.

_____
_____
_____
_____

3) Have you seen any positive or negative changes in your child since starting the intervention? If so, please provide an example.

_____
_____
_____
_____

4) What did you like and/or dislike about the intervention and overall experience? Please be as specific as possible.

_____
_____
_____
_____

5) Any additional feedback (positive or negative) you'd like to share?

_____
_____
_____
_____

Appendix J

Social Validity Questions—Participant

1) Did you enjoy coming to the group?

_____
_____
_____
_____

2) Was the SBM helpful? Did you feel like you learned anything?

_____
_____
_____
_____

3) In social situations, do you think more about what is expected and unexpected?

_____
_____
_____
_____

4) Anything else you would like to share (positive or negative)?

_____
_____
_____
_____