
Emerging Social Skills Interventions for Individuals with Autism

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In addition to the evidence-based interventions discussed in this book, there are several interventions developed to improve social competence for individuals with autism spectrum disorder (ASD) that show promise. While the interventions we discuss in this chapter have one or more studies suggesting clinical benefit for individuals with ASD, by definition they are not well-established at this time, often because the research base lacks methodological rigor (e.g., large-scale controlled trials) and/or because the extant research is still fairly new. Further exploration of these emerging interventions, however, is crucial in order to gather evidence regarding effective interventions for individuals with ASD. In this chapter, we describe some of the emerging interventions targeting social skills for individuals with ASD, review the existing research on the use of the interventions, and highlight the clinical implications for these techniques.

As emphasized throughout this book, many evidence-based interventions have already been identified that target social skills in individuals with ASD. These interventions have established

support for being beneficial in improving social skills for this population. Why is it therefore necessary to create and evaluate new interventions? While the evidence-based treatments have been shown to benefit children, adolescents, and adults with ASD, not every treatment significantly improves social skills for every individual. ASD is a heterogeneous condition, and every individual has different needs and learning styles. For example, while some individuals benefit from group social skills settings, others may find it difficult to participate or even attend such groups. This is especially a concern given the high comorbidity of conditions seen with this population. For an individual who is unable to leave the house or participate in existing interventions, other types of therapies (e.g., utilizing technology) might be beneficial. It is therefore necessary to create and evaluate these emerging interventions to provide interventions to those individuals for whom the current best practice treatments are not effective.

There are several published meta-analyses on social skills interventions for individuals with ASD (e.g., Bellini, Peters, Benner, & Hopf, 2007; Reichow & Volkmar, 2010; Wang, Parrila, & Cui, 2013), and even a National Professional Development Center (NPDC) dedicated to promoting the use of evidence-based practices with individuals with ASD. However, most of these reviews focus on evidence-based treatments only, and, therefore, the reviews on emerging interventions have

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been left largely unexplored. A notable exception is the National Standards Project (NSP), an initiative of the National Autism Center in providing information regarding evidence-based guidelines and effective interventions for individuals with ASD. The main focus of NSP is to evaluate interventions for individuals with ASD, resulting in the categorization of interventions into established treatments, emerging treatments, and unestablished treatments. The reviewed treatments include any intervention for individuals with ASD including, but not limited to, interventions targeting social skills. In addition, the prior literature reviewing these interventions has not addressed the clinical implications of their use. Therefore, in this chapter, we expand on existing literature by providing full descriptions of the emerging interventions for targeting social skills in individuals with ASD, providing research highlighting the potential benefits of the intervention and the remaining aspects that need further exploration, and addressing the clinical implications for use of these emerging interventions.

When discussing emerging interventions, it is important to distinguish whether the discussed intervention is a specific program (i.e., a protocol) versus a broader technique or method used across different programs. In this chapter, we will describe the emerging interventions in terms of broader techniques used to improve social skills and highlight a few examples of specific programs within each broad categorization. The techniques and specific programs discussed in this chapter however are not exhaustive, as there are hundreds of interventions that show some support behind them. Instead, only selected examples are provided to give the reader an idea of how the technique can be implemented. The focus is on the research behind the technique (not a specific protocol), as the technique can be implemented in variety of ways. Given that there are many published studies exploring potential social skills interventions for individuals with ASD, in this chapter, we discuss intervention techniques that have sufficient support for their use and therefore would benefit from further exploration.

To provide an organizational heuristic, we review the research for each of the categories of social intervention across three main domains: (1) proximal vs. distal target of intervention, (2) taught vs. generalized skill, and (3) in-house vs. external evaluation. These categories provide basic information with which to make comparisons across a diverse set of intervention categories with respect to the development and maturity of the research base. While these categories are useful in this regard, they are not sufficient to make comparisons of relative efficacy. We focus on these domains in order to be able to make comparisons across diverse intervention approaches. Doing so permits a more nuanced perspective on the relative promise or efficacy of each approach, as they are at different stages of development and target separate, though related, processes related to social function. Proximal versus distal target refers to the question of whether the intervention targets the specific social skill or behavioral deficiency directly or indirectly. As highlighted by Yoder, Bottema-Beutel, Woynaroksi, Chandrasekhar, and Sandbank (2014), treatment effectiveness varies greatly depending on whether the skill is directly targeted or not, with much greater treatment effectiveness found for interventions targeting social communication directly (proximal outcome) compared to indirectly (distal outcome). Mechanism-focused interventions that evaluate proximal outcomes are important in order to understand the process, or drive, that leads to the change (cf, Lerner, White, & McPartland, 2012). However, as Yoder and colleagues note, to be able to conclude that treatment impacted the penultimate behavioral target (e.g., social skill), researchers should show change in behavior beyond the proximal target (e.g., facial recognition). Therefore, both proximal (mechanism-focused) and distal (outcome) interventions are necessary.

The second category, taught versus generalized skill, refers to the breadth of impact. In other words, is there change observed only in a discrete or tightly parameterized behavior (e.g., eye contact) or is change broader, extending beyond explicitly taught behaviors (e.g., initiations, social responsiveness,

play)? This domain is related to the question of proximity, but highlights the task used to evaluate the treatment effectiveness and showing of the skills beyond the specific task. The importance of generalization in clinical intervention has been highlighted by multiple researchers throughout the years (e.g., Stokes & Baer, 1977). Many argue that generalization should not be treated as a passive phenomenon, such that one assumes generalization will occur organically; rather, researchers must actively promote generalization of the skills taught. Generalization is important when discussing treatment effectiveness as the aim of the intervention is to help individuals with ASD in everyday interactions, not just during treatment in a specific setting.

The third domain, in-house versus external evaluation, highlights the question of whether the approach or specific program has been evaluated by only one research team, usually the group that developed the approach, or whether the same program has been evaluated externally by another research team. This third domain has long been upheld as a variable in determining the rigor of evidence for the efficacy of treatment approaches. For instance, it is one of the criteria for empirically validated treatments put forth by Division 12 Task Force on Promotion and Dissemination of Psychological Procedures (Chambless et al., 1998). This criterion is important to avoid research bias as outcomes of certain therapies might or might not be reported based on self-serving interest of the researchers.

Of note, these three domains highlight only a few of the many parameters that need to be explored when establishing efficacy of an intervention. For this review, we focus on the general description of the intervention and the research behind the intervention type and, therefore, focus on three domains that are often noted as lacking in prior studies and reviews. The importance of exploration of mechanism-driven versus distal outcome interventions, generalizability, and replicability of studies has been established. While not exhaustive, all together, these three domains allow for an initial investigation of the research support behind the emerging interventions for social skills for individuals with ASD and in identifying gaps that need to be further explored.

23.1 Technology-Based Interventions

Technology-based interventions present instructional materials using the medium of technology, broadly defined as any tool, device, or procedure using electronics. There has been a recent increase in use of technology as an intervention tool, due to provision of speed, convenience, and accessibility. As highlighted in the meta-analysis by Grynszpan, Weiss, Perez-Diaz, and Gal (2014), several advantages of technology-based interventions for ASD have been identified, including consistency of a clearly defined task (Murray, 1997) and freedom from social demands that are often challenging for individuals with ASD (Moore, McGrath, & Thorpe, 2000; Murray, 1997). As highlighted by Grynszpan and colleagues, while technology-based interventions have been utilized for many years, they are still categorized as “emerging” (e.g., Wilczynski et al., 2009), as much of the published research focuses on the potential of its use (e.g., feasibility, acceptability) rather than assessment of treatment efficacy.

While all technology-based interventions utilize technology to deliver the treatment, it is important to emphasize the wide variety of interventions within this domain. Technology-based interventions include those run on computers, interventions run on mobile-based or handheld electronics that use wireless computing (e.g., phones, tablets), interventions utilizing virtual reality or computer-simulated reality which replicate an environment that can be interacted with, and interventions utilizing humanoid robots that directly interact with the participant. The technology-based interventions therefore span a wide variety of treatments that differ substantially. Distinguishing the type of technology-based intervention within this domain is therefore important in evaluating the evidence for the treatment’s effectiveness. Among the different types of technology, computer-based training programs have attracted the most attention (Bölte, 2004), and, therefore, this section focuses on computer-based interventions.

Examples of technology-based interventions include *Let’s Face It!* program (Tanaka et al., 2010), *Junior Detective Training Program*

(Beaumont & Sofronoff, 2008), and *Mind Reading: The Interactive Guide to Emotions* (Baron-Cohen, Golan, Wheelwright, & Hill, 2004). *Let's Face It!* program is a computer-based intervention comprised of interactive computer games targeting inattention to the eyes, impaired recognition of identity, and failure to perceive faces holistically, all aspects of social skills that have been found to be impaired with individuals with ASD. Specifically, the games reinforce attending to faces, recognition of facial identity and expression, and interpretation of facial cues in a social context through seven interactive computer games. Tanaka and colleagues evaluated the program and found that relative to the control group, children who completed the *Let's Face It!* program showed improvements in the recognition of mouth features and holistic recognition of a face.

Junior Detective Training Program (JDTP) is comprised of a group social skills training, parent training, teacher handouts, and a computer game. Therefore, as opposed to the *Let's Face It!* program, the technology is only one component as opposed to the entire intervention. The computer game aspect of the program focused on emotion recognition, emotion regulation, and social interaction skills. In the game, the user is a detective who specializes in decoding other's mental states. The computer system utilizes both human- and computer-animated characters to teach emotion recognition and social problem-solving. The game is tailored and individualized based on how the user progresses through the program. Results from the randomized controlled trial suggest that children who received the treatment significantly improved on their knowledge of emotion coping strategies, emotion recognition skills, as well as social skills as measured by parent report (Beaumont & Sofronoff, 2008). However, the study did not measure generalization of social skills to real-life social contexts.

Mind Reading: The Interactive Guide to Emotions is an interactive computer-based program developed to teach individuals with ASD about emotions

and mental states. The program uses video, audio, and written text to teach emotions. Users are able to explore emotions through an interactive library, complete lessons and quizzes, and play games about emotions. Studies found that individuals who completed the intervention improved significantly on identifying emotions from faces and voices (Golan & Baron-Cohen, 2006). However, results found no difference between groups on a generalization task that used face and voice stimuli that were not included in the program.

Together, research across the technology-based interventions provides evidence for the usefulness of the interventions to address social skill deficits for individuals with ASD. The studies have found technology-based interventions to be feasible in changing targeted mechanisms and acceptable for individuals with ASD to use. Findings suggest that some studies have addressed mechanism-driven outcome (e.g., inattention to the eyes in the *Let's Face It!* program), but many technology-based studies have also evaluated more distal outcomes (e.g., emotion recognition). In terms of generalizability, the majority of the studies have not evaluated whether the skills generalize outside of the stimuli presented in the programs. Those that have attempted to explore generalization (e.g., *Mind Reading: The Interactive Guide to Emotions*) found that the results do not generalize to stimuli not presented in the program. Therefore, future research in the domain of technology-based interventions needs to address the lack of generalizability of the social skills taught. Lastly, across the interventions explored in this section, nearly all of the research has been conducted by the groups that developed the specific intervention. Replication studies need to be conducted outside of the parent lab in order to provide further evidence for the intervention's utility in augmenting social skills for individuals with ASD. Even though further evaluation needs to occur to address the gaps in generalization and the dearth of replication studies, the current state of research shows promise of utilizing technology-based interventions to increase social skills (e.g., emotion recognition) for individuals with ASD.

23.2 Cognitive-Behavioral Interventions

Cognitive-behavioral therapy (CBT) is an established treatment for many disorders, such as anxiety disorders (e.g., Hofmann & Smits, 2008; Olatunji, Cisler, & Deacon, 2010) and major depression (e.g., Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). CBT-based approaches for a range of clinical problems have also been extended to youth with ASD, with considerable clinical promise (see Scarpa, White, & Attwood, 2013). In the context of social skill programs, interventions in this category share a dual focus on altering how the client acts and how she/he thinks or processes situations. Cognitive-behavioral interventions for socialization target both social skills, or behaviors, and the cognitive processes involved in social interaction, such as inferring others' unspoken intentions and anticipating the likely consequences of one's behaviors. Within this group of interventions, there is tremendous variability in the specific foci of protocols. For instance, some might focus primarily on cognitive skills such as perspective-taking or nonverbal emotion detection/interpretation and secondarily teach strategies for managing social situations.

The Secret Agent Society (SAS) is a cognitive-behavioral program that targets social-emotion skill development in children, ages 8–12, with ASD (Beaumont & Sofronoff, 2013). It is multi-component, in that the program employs an interactive computer game, weekly small-group meetings, parent sessions, and teacher training in the form of written “tip” sheets. The research to date on SAS suggests the program is helpful. A randomized controlled trial (RCT) in which SAS was compared to a wait list reported significant gains in both social skills and emotion regulation, and these gains were largely maintained 5 months following treatment (Beaumont & Sofronoff, 2008). The authors reported no significant gains in expression recognition, contrary to what was expected, given that recognition of emotion using facial expression and body posture was explicitly targeted in the intervention.

Lopata, Thomeer, Volker, and Lee (2013) developed a cognitive-behavioral social skills curriculum that is implemented in the context of a summer treatment program for higher functioning children with ASD. The program is delivered over the course of 5 weeks, 5 days per week, in a group format. The curriculum adapted *Skillstreaming* (McGinnis & Goldstein, 1997), a structured social skills training program to directly target multiple areas of social difficulty commonly seen in ASD, such as emotion recognition impairment (face-emotion recognition instruction), pragmatic communication (training in understanding nonliteral language), and skill generalization (parent training). Training is delivered in 20-min cycles throughout the day via the established stepwise procedure (e.g., define skill, model skill, role-play the skill). The summer treatment program also includes activities to promote social interaction and cooperative play among the youth. Four studies thus far have been published on the impact of this summer program, including a case study (Toomey, Lopata, Volker, & Thomeer, 2009) and three RCTs. Two of these RCTs did not include a no-treatment comparison group; rather, the comparator was the test intervention augmented with a response-cost behavior management system (Lopata, Thomeer, Volker, & Nida, 2006; Lopata, Thomeer, Volker, Nida, & Lee, 2008). The third RCT randomized the 36 participants to either the summer treatment program or wait-list control group, and results demonstrated significant improvement for the treatment group on most of the parent report and direct child-assessed outcome measures (Lopata et al., 2010). Collectively, this body of work suggests that the comprehensive, summer treatment program results in improved adaptability and social skills.

In addition, the *Cool versus Not Cool* procedure (Taubman, Leaf, & McEachin, 2011) similarly targets individuals' cognitions and behaviors. The *Cool versus Not Cool* procedure teaches individuals with ASD to understand the difference between cool behaviors (i.e., those that are socially appropriate) and those that are not cool (i.e., those that are not socially appropriate). Leaf et al. (2012) evaluated the effects of the

procedure with three children diagnosed with ASD and found the procedure to be effective in teaching some social skills. In a recent study by Leaf, Mitchell, Townley-Cochran, McEachin, Taubman, and Leaf (2016) comparing *social stories* to *Cool* versus *Not Cool* procedure, they found the *Cool* versus *Not Cool* procedure to be more effective than the *social stories* procedure in terms of participants acquiring the skills taught. As authors note, however, generalization measures were limited, and therefore future research is needed in this domain.

The Cognitive-Behavioral-Ecological intervention (CBE; Bauminger-Zviely, 2013) is yet another promising curriculum. In addition to addressing how children think and feel in social interaction and what they do (i.e., behavior), CBE targets cognitive processes that may mediate behavioral-emotional responses in social interactions (e.g., misperceptions of social world). CBE can be delivered in a dyad format (Bauminger, 2002) or in groups (Bauminger, 2007) in schools, implemented by teachers (Bauminger-Zviely, 2013). CBE focuses on building basic and complex social-emotional understanding and skills training (e.g., social problem-solving). Several studies of CBE (both dyadic and group) have been conducted by Bauminger and her colleagues, the results of which are quite promising. CBE is associated with gains in the social-cognitive domain (e.g., emotion knowledge) and the behavioral domain, but limited generalization of skills to other contexts such as school recess (Bauminger, 2007). There is also evidence that CBE is associated with direct benefits (e.g., social-emotional understanding) and indirect, perhaps mediating, effects (e.g., theory of mind, executive function; Bauminger, 2007).

The majority of the published research has focused primarily on distal outcomes, although there has been emerging research on theorized proximal mechanisms of action (e.g., change in theory of mind). There has been little investigation on the generalization of learned skills. Finally, nearly all of the research in this domain has been conducted by the groups that developed

them, with very little replication work or multi-site study. Additionally, most CBT social skills interventions have been developed for, and exclusively evaluated within samples comprised of, youth with ASD with intact cognitive abilities. This is understandable given the demands on verbal reasoning and cognitive introspection associated with such programs. Nevertheless, consideration of the extant CBT-based social skills intervention research as a whole, including that on the aforementioned programs and other such interventions (e.g., Koning, Magill-Evans, Volden, & Dick, 2013), suggests that interventions in this category are promising and further study, especially multisite trials with sufficiently large samples, is warranted.

23.3 School-Based Interventions

There is a considerable amount of research examining interventions conducted in school settings, including several well-done qualitative and quantitative reviews. Most of these reviews have adopted the intervention categorization scheme initially used by McConnell (2002) in an early qualitative review of social interventions for young children with ASD, which groups strategies into five fairly broad categories: (1) environmental modifications (e.g., altering classroom to promote physical proximity to peers), (2) child-specific (e.g., direct skills training with the diagnosed student), (3) collateral skills (e.g., encouraging group play during recess), (4) peer-mediated (e.g., training typical peers to assist the student with ASD), and (5) comprehensive (e.g., combining at least two types of intervention). Given that the majority of this body of research has not focused on specific curricula, in this chapter we focus on these categories as well.

Bellini et al. (2007) conducted a meta-analysis of 55 single-subject school-based social interventions. In addition to finding that such interventions are “minimally effective” (p. 159), they also noted poor generalization of learned skills across settings and stimuli (Bellini et al., 2007). Recently, Whalon, Conroy, Martinez, and Werch (2015) conducted a meta-analysis of 37 single-subject, school-based

interventions, implemented with preschool and elementary students, specifically targeting peer-related social competence. Using the same categorization scheme, Whalon et al. found the interventions to have moderate to high impact across the targeted behaviors of initiations toward peers, responses to peer initiations, interactions, and peer social engagement. Moreover, they found no evidence for difference across technique category (e.g., child-specific vs. collateral skills training).

The most common type of school-based social intervention is child-directed, encompassing a range of techniques such as video-modeling and social narratives (Whalon et al., 2015). One fairly common approach within the child-directed category is structured skills training delivered directly to the students with ASD. A common criticism levied against such skill-based approaches is that discrete skills (e.g., how to maintain a conversation) do not equate to social competence. In other words, learning the skill does not necessarily mean the student will use that skill when it is called for or in a socially appropriate way. To address this deficiency, some programs (e.g., *Superheroes Social Skills* program; Jenson et al., 2011) have been implemented in more generalized (e.g., non-pull-out) settings. The *Superheroes Social Skills* program includes strategies to directly promote generalization, and research on its efficacy when delivered during recess at school has shown positive effects on social engagement (Radley, Ford, Battaglia, & McHugh, 2014).

The extant research suggests that, regardless of type of intervention, utilization of peer-mediation (e.g., training typical peers to help reinforce taught skills) is helpful and should be considered an evidence-based practice (Reichow & Volkmar, 2010; Whalon et al., 2015). Watkins et al. (2015), based on a thorough review of peer-mediated interventions, concluded that the approach is promising not just for children but also for adolescents and young adults with ASD within inclusive settings. Peer-mediated interventions are diverse in structure, degree of training, and content ranging from giving peers direct, explicit instruction on how to prompt and reinforce social interaction for the student with ASD (e.g., Banda, Hart, & Lui-Gitz, 2010) to identifying mutual interests to incorporate

into social activities (e.g., Koegel, Vernon, Koegel, Koegel, & Paullin, 2012).

In synthesizing the school-based intervention research, including the published reviews within this category, it is clear that much of the work in this area has focused on the observed, distal outcomes of interest (e.g., peer initiations). There has been little concerted effort to “move the needle” of targeted mechanisms of interest (e.g., social motivation or drive). This may be, at least partly, because these interventions are primarily behavioral in nature and, for the most part, not tethered to a particular theoretical framework. For example, in a cognitive framework, anticipatory fears may guide avoidance of a situation, and therefore targeting the cognitions (i.e., fears) under this framework may be more beneficial than targeting the behavior of avoidance alone. Additionally, in this category of social intervention research, there have been relatively few evaluations of specific programs or curricula, likely owing to the challenges inherent in intervention implementation within the school day (e.g., short periods, school absences, number of participants available in a given school or classroom). Perhaps more than any other type of intervention reviewed in this chapter, the generalizability of the effects of school-based social interventions has been well-studied. Although the quality of the data varies across studies, generalization across peers and settings has been explored. It is generally agreed, for example, that effects of peer-mediated interventions do generalize outside the confines of what is taught and where it is taught (e.g., Watkins et al., 2015). Finally, partly due to how interventions have been categorized (e.g., approaches such as “peer-mediated,” rather than specific curricula), we see considerable external evaluation research.

23.4 Interventions Targeting Social Cognition

Social cognition refers to the cognitive mechanisms that influence social behavior. Under this umbrella, we often consider processes such as executive function, emotion recognition, perspective-taking,

theory of mind, and social problem-solving or reasoning in ASD (see Mendelson, Gates, & Lerner, 2016). Several such processes have been targeted in social interventions. Herein we describe some interventions purported to address some of these social cognition processes.

In day-to-day social interaction, people rely on multiple cues (e.g., posture, facial expression, intonation, and gesture) to intuit the felt emotions of social partners. Of these nonverbal social-affective communication behaviors, facial emotion recognition (FER) has arguably been the most well-studied process within ASD. Although the research has not produced an entirely consistent picture, this is due at least in part to methodological variation (e.g., age range of sample, duration of stimuli) across studies (e.g., Harms, Martin, & Wallace, 2010), more so than actual ASD-related FER impairment or lack thereof. Additionally, recent research suggests that both motivational and perceptual processes are involved in observed FER impairments in ASD. Specifically, social motivation has been found to predict worse FER for youth with ASD and to partially mediate the relationship between early-stage face perception and FER (Garman et al., 2016). Two recent meta-analyses suggest that FER deficits are common in ASD and that the magnitude of deficiency (relative to similar-age peers) worsens with age (Lozier, Vanmeter, & Marsh, 2014; Uljarevic & Hamilton, 2013). These deficits are most apparent when using adult (as opposed to child) face stimuli, when the emotions are negatively valenced (e.g., anger), and when the emotions are expressed subtly (Lozier, Vanmeter, & Marsh, 2014; Uljarevic & Hamilton, 2013).

It is generally believed that recognizing and responding to others' emotional expressions is important for successful interpersonal relationships and that FER deficits likely contribute to the social disability that characterizes ASD (Ekman, 1992; Schultz et al., 2003). Although FER training has been extensively studied in ASD, this has primarily been within multicomponent intervention programs (e.g., Lopata et al., 2013). As such, it is not clear if remediation of FER impairment is sufficient to ultimately lead to observable improvement in social function. Golan and Baron-Cohen (2006) tested the effects of *Mind Reading* (Baron-Cohen, Golan, Wheelwright, & Hill, 2004), which

targets emotion recognition using facial and vocal cues, in a small open trial. They found that the adult participants who received the intervention improved on close generalization tasks (recognizing emotion using stimuli included in the intervention) but not on more distant generalization tasks, such as recognizing emotions in characters from previously unseen film clips. There is, however, emerging support for a directional relationship between improved emotion recognition and social function. In a small RCT, Hopkins et al. (2011) showed that *FaceSay*, a computerized intervention that targets improved eye gaze, face processing, and FER, was associated with improved FER as well as better social functioning with peers in a sample of children with ASD.

It should be noted that there has not been clear discrimination within the treatment literature among the related constructs of social cognition, mind reading, theory of mind (ToM), and perspective-taking. In the last several years, interest in treatments targeting various aspects of social cognition has risen, due in part to questionable sustained and generalized impact for purely behavioral, skills-based intervention approaches (Howard & Renfrow, 2003). Although the research on ToM impairment in ASD has not uniformly revealed deficits relative to typical peers, it is generally accepted that perspective-taking is more universally and pervasively impaired for individuals with this disorder (Mendelson, Gates, & Lerner, 2016). In an RCT with 40 cognitively able youth with ASD, Begeer et al. (2011) found that participants who completed a ToM intervention showed significantly improved ToM conceptual skills, but no significant improvement in empathy or parent-reported social behavior, relative to controls.

Perspective-taking, which is closely related to ToM, involves appreciating another's cognitive or emotional experience and recognition that that experience is unique and different from one's own (e.g., Davis, 1983). The *Social Competence Intervention*, initially developed for adolescents (SCI-A; Stichter et al., 2010), was later modified for use with elementary-age youth (SCI-E). SCI targets a host of cognitive processes including impairments in ToM, emotion recognition, and executive functioning in order to effect positive change, ultimately, in social ability. Content

includes training in FER, sharing ideas, and social problem-solving. An open trial of SCI-E with a modest size sample ($n = 20$) found significant improvements in parent-reported (unblinded to treatment intent) executive function and social skills (Stichter, O'Connor, Herzog, Lierheimer, & McGhee, 2012). However, the study design did not permit examination of the mediating effect of the targeted social-cognitive processes. Crooke, Hendrix, and Rachman (2008) studied *Social Thinking* (Winner, 2000), a social intervention designed to target executive function impairments and teach the cognitive skills and knowledge underlying social discourse, rather than discrete skills (behaviors), in six children with ASD using a pre-post design (Crooke et al., 2008). Delivered over 8 weeks in hour-long sessions, the intervention primarily focuses on explaining the "why" (rationale) for social skills and that other people have independent thoughts (ToM and perspective-taking). Behavioral data indicated improvements in socially appropriate behaviors and decreases in unexpected or atypical behaviors, following intervention (Crooke et al., 2008).

Several curricula within this category target multiple aspects of social cognition. For instance, *Social Cognition and Interaction Training* (SCIT; Roberts, Penn, & Combs, 2004) targets emotion recognition, ToM, and attributions. Although originally developed for adult patients with psychosis, SCIT has been tested with adults with ASD (SCIT-A; Turner-Brown, Perry, Dichter, Bodfish, & Penn, 2008). In a small quasi-experimental treatment study, Turner-Brown and colleagues found that the participants who received SCIT-A showed improvements in ToM skills and a trend toward improved social communication skills (though not statistically significant). Another intervention initially developed for and tested among patients with schizophrenia that has since been adapted for individuals with ASD is *Cognitive Enhancement Therapy* (CET; Hogarty & Greenwald, 2006). In an open trial, Eack et al. (2013) tested CET with a sample of adults with ASD. Delivered over a course of 18 months, CET integrated computer-based neurocognitive training (targeting attention, memory, and problem-solving) with group sessions (targeting perspective-taking and social appraisal). Significant improvement was

seen both for cognitive deficits and social behavior, with large effects (Eack et al., 2013).

Finally, *Unstuck and On Target* (UOT; Cannon, Kenworthy, Alexander, Werner, & Anthony, 2011) is a psychosocial treatment that targets executive function impairment for individuals with ASD, specifically cognitive flexibility (e.g., diminished insistence on sameness) and goal-directed behavior. In a rigorous RCT conducted by Kenworthy et al. (2014), UOT was implemented across contexts (i.e., school and home) and compared to a fairly structured social skills intervention. They found that the UOT group outperformed the comparator (i.e., social skills intervention) on measures of problem-solving, flexibility, and planning/organization. Moreover, the UOT participants made significantly greater improvement behaviorally in the classroom (e.g., rule-following, handling transitions) than the participants in the social intervention. However, there were no group differences in terms of improvement in social skills (Kenworthy et al., 2014).

There has been a tremendous upswing in research on interventions targeting the facets of social cognition in ASD in the last several years. Admittedly, we have reviewed just a small fraction of this treatment research. Although the majority of the studies in this category have assessed change in both proximal (e.g., ToM, FER) and distal (e.g., social competence) outcomes, the evidence for clinically significant improvement in the more manifest, distal outcomes remains sparse (exceptions include Eack et al., 2013 and Hopkins et al., 2011). Future clinical research in this area should continue to explore change at both levels in longitudinal, experimental designs in order to establish temporal precedence and causation. As a whole, this body of research has consistently explored variables of interest outside of those directly targeted in treatment (e.g., recognition of emotion using non-trained stimuli). Finally, this is a vast body of research that is still fairly young and being actively explored by multiple research teams. Understandably, therefore, most of this research has been conducted by teams that have developed the treatment protocols or modified preexisting protocols. In the future, we will need to focus

efforts on replication and external site validation (e.g., trials conducted by nondevelopment sites).

23.5 Naturalistic Interventions

Naturalistic treatments address a major limitation of many existing interventions that are often highly structured in setting and delivery and therefore may impede generalization to the natural environment. Naturalistic behavioral treatments are specifically designed to address these limitations by incorporating techniques aimed to facilitate learning (e.g., multiple trials, shaping) with techniques to aid in generalization, including teaching during naturally occurring instances, using natural consequences, and by following the child's lead (Kaiser, Yoder, & Keetz, 1992). The distinctive features of naturalistic interventions include sessions that are less structured, lessons initiated and paced by the child, lessons taking place in variety of locations, and employment of a variety of stimuli and prompts (Cowan & Allen, 2007; Delprato, 2001). In addition, as noted by Delprato (2001), instead of functionally unrelated reinforcers (e.g., candy) which are often used in behavioral interventions, naturalistic treatments allow for child to select the desired object to serve as a natural reinforcer. Several of the naturalistic treatments have already been discussed in this book, including incidental teaching and pivotal response training. There are however several other interventions that fall in this category that are not yet established. We review a few examples of these in this section.

Enhanced Milieu Teaching (EMT) is a naturalistic, conversation-based teaching method that uses child's interest and initiations as opportunities to teach social communication (Kaiser, 1993). EMT takes a hybrid approach, incorporating behavioral and social interactionist approaches to intervention. Key components of EMT are (1) creating an environment that promotes engagement and communication, (2) responding to a child's interests and ability level to build conversational interaction, and (3) communicating in a way that promotes meaningful play and interaction (Hancock & Kaiser, 2009). Hancock, Ledbetter-Cho, Howell,

and Lang (2016) reviewed the existing research on the effectiveness of EMT and found that overall, EMT implemented by therapists, teachers, and parents is an effective language intervention for preschool children with autism (e.g., Hancock & Kaiser, 2002) as well as other populations. As the authors noted, however, the research has been limited to preschool-age, Euro-American children who have significant language delays.

Multiple studies which have utilized imitation to increase social skills have suggested that repeated imitation results in an increase of social behaviors in children with ASD. While not always conducted in the naturalistic environment, some interventions utilizing imitation can be considered as a naturalistic intervention, as the child is not instructed to act a certain way, rather, the adult imitates the natural behaviors of the child. For example, Field, Field, Sanders, and Nadel (2001) explored the effects of adult repeated imitation with 20 nonverbal children with a diagnosis of ASD and found increases in looking, vocalizing, smiling, and engaging in reciprocal play. In addition, children who received the intervention showed several social behaviors, including being close to the adult, sitting next to the adult, and touching the adult following the intervention. Therefore, both distal and proximal social behaviors were augmented following the intervention. During the repeated imitation sessions, an adult imitated all of the child's natural behaviors (i.e., what the child was doing without any prompts) during the session. It was the action of the adult imitating these naturally occurring behaviors which resulted in change in social behavior. This study suggests the potential use of the imitative behavior by the adult in a naturalistic framework as an early intervention for children with ASD.

A specific example of a naturalistic imitation training is the *Reciprocal Imitation Training (RIT)* (Ingersoll, 2008). RIT is a play-based, naturalistic intervention aimed at increasing imitation skills in children with ASD. RIT has been specifically designed for young children with autism, as they often show difficulty with imitation (see Rogers, 1999 for review). The goal of RIT is to teach imitation as a means of social interaction, in a naturalistic setting. It can be implemented

during play inside and outdoors, as well as during daily routines. The technique incorporates several strategies, including contingent imitation, linguistic mapping (i.e., describing what the child is attending to or doing using simple language), following the child's lead, physical prompting, and contingent reinforcement (Ingersoll & Schreibman, 2006). Research suggests that RIT increases social communication skills, including social engagement and joint attention (Ingersoll, Lewis, & Kroman, 2007; Ingersoll & Schreibman, 2006). While this treatment approach has a substantial set of studies indicating efficacy for increasing variety of social skills (e.g., Ingersoll, 2010, 2012; Ingersoll & Lalonde, 2010; Ingersoll et al., 2007), most of this work has been conducted by the same research group.

Many naturalistic interventions (discussed in other chapters of this book) have a strong evidence base behind their effectiveness in augmenting social skills for individuals with ASD. The emerging naturalistic interventions discussed in this section (i.e., EMT, repeated imitation, RIT) show some evidence behind their utility; however, these emerging naturalistic interventions need further exploration. Although the majority of the research has been on distal targets of social skills, some beginning work on proximal factors is emerging with the repeated imitation intervention. A major strength of all naturalistic interventions, possibly more so than any other treatment category discussed in this chapter, is the work on generalizability of the results, since the programs have been specifically developed using techniques to aid in generalization (i.e., using natural environment to increase generalizability of skills). Lastly, in terms of replicability of results, while the specific protocols (i.e., RIT) have only been assessed using the team that developed the program, the general techniques discussed in this section have been replicated by multiple teams (e.g., repeated imitation has been explored by multiple teams). Therefore, the preliminary evidence suggests that these emerging naturalistic interventions show promise for augmenting social skills for individuals with ASD, and therefore further research into these techniques is required.

23.6 Theater-Based Interventions

Theatrical or drama-based interventions consist of interventions that use theater or dramatic training activities to practice areas of social skill deficits among individuals with ASD. These interventions address the limitations of several social skills interventions, including lack of generalization and posttreatment skill maintenance (e.g., White, Keonig, & Scahill, 2007). Drama-based interventions allow individuals with ASD to increase understanding of social narratives that arise from social interactions and help to increase imagination and sensitivity to others (Tytherleigh & Karkau, 2010). As highlighted by Corbett et al. (2014), acting teaches social awareness, cognition, communication, perception, and expression, and therefore, it holds promise as a tool to increase social skills for individuals with ASD. Prior research has shown that aspects of drama-based interventions, such as acting and role-play, increase empathy, ToM, and social skills for typically developing individuals (Goldstein, 2011; Goldstein & Cisar, 1992). Therefore, use of drama-based interventions holds promise to increase these social skills in children and adolescents with ASD.

Socio-dramatic affective-relational intervention (SDARI; Lerner, Mikami, Levine, 2010) is a group-based, six-week, manualized intervention for adolescents with ASD. The curriculum includes activities based on dramatic improvisation-based games that focus on training participants to attend to reciprocal interaction cues. The fun and interactive curriculum which incorporates games and humor provided participants an opportunity to practice the social skills within game-based instruction. The intervention includes three components: a performance-based social skills curriculum with improvisation games and dramatic training, focus on relationship building to reinforce social interaction, and employing age-appropriate motivators to promote the generalization of skills in other settings. Lerner et al. (2010) evaluated the intervention in a pilot study with individuals with ASD and found that individuals who participated in the intervention displayed gains in

some social skills (e.g., social assertion and ability to detect emotions), but not others. The study also found evidence for generalization of the social skills and posttreatment maintenance.

Social Emotional NeuroScience Endocrinology Theatre (SENSE Theatre; Corbett et al., 2011) is an intervention program aimed at improving social and emotional functioning of children and adolescents. It uses behavioral intervention in combination with theatrical techniques to improve social skills for individuals with ASD. In the program, each child with ASD is paired with a typically developing child who serves as the peer model (Corbett et al., 2011). Corbett et al. (2011) investigated the efficacy of the intervention with eight individuals with ASD and found that in addition to reducing anxiety and stress among participants involved in the theater-based program, the program was also effective for improving the social perception skills of children with ASD. Corbett et al. (2014) further investigated the effectiveness of this drama-based peer-mediated intervention during a two-week summer camp and found further support for its use to improve social skill deficits among youth with ASD. Individuals with ASD significantly improved face perception skills (e.g., identify and remember facial stimuli, but not emotion recognition), even though participants did not receive direct instruction in face processing. In addition, improvements in social perception were observed outside of the treatment setting. Following the intervention, participants also demonstrated improvement in their ability to interpret the social meaning of engaging with others, and the amount of time they spend engaging with peers increased over the course of the intervention.

Theater-based interventions attempt to fill a gap of many social skills interventions in providing a fun, interactive, and motivating way for individuals with ASD to build social skills through group-based theater. Evidence suggests that through this modality, individuals with ASD learn multiple important skills for social interactions. However, large-scale studies looking at drama-based interventions, independent of a par-

ticular protocol, are lacking. Within the two reviewed protocols, the interventions have been focused primarily on distal outcomes of social skill improvement. Evaluation of proximal mechanisms behind the change (e.g., face memory), however, is emerging (Corbett et al., 2014). A strength of these interventions, however, is on the emerging investigation of the generalization of the skills, especially in regard to the SDARI model which was built upon existing social skills training taking into account recommendations to increase social motivation and skill generalization (Lerner et al., 2010). Further research on generalizability of the learned skills across these drama-based interventions is warranted. A noteworthy limitation of the current literature base on drama-based intervention, similar to other techniques discussed in this chapter, is the lack of replication of work by individuals outside of the groups that developed them. The promising emerging evidence regarding the improvement of some social skills with the use of drama-based interventions, however, suggests the need for further exploration and replication of these studies in larger samples.

23.7 Conclusions

In this chapter, we have provided a synopsis of the extant research on a vast array of emerging social skills interventions. Although the approaches reviewed herein are not yet considered well-established, they are considered *promising* based on the research published to date, and further evaluation of them is warranted. We reviewed emerging interventions across six fairly broad categories or foci: technology-based, cognitive-behavioral, school-based, social cognition, naturalistic, and theater-based. These categories are not mutually exclusive of one another; for instance, a treatment that targets social cognition might utilize technology.

It must also be noted that we have not conducted a comprehensive review of all social interventions that one might consider promising. Indeed, there are several curricula that have some research to suggest efficacy, which have not been

included. Inclusion of all the relevant research is beyond the scope of a single chapter. Our goal was to provide a synthesis of the commonalities seen across different categories of intervention, in order to inform the field regarding future directions in this area.

In an attempt to draw conclusions across this diverse literature and offer suggestions for future research, we considered the following domains: (1) proximal vs. distal target of intervention, (2) taught vs. generalized skill, and (3) in-house vs. external evaluation. Most of the research to date has focused on either targeted mechanisms (proximal processes) or outcomes (distal processes). Few studies have attempted to examine both simultaneously. It is critical that clinical research examine both levels of change, in order to understand if and how effected change in the theoretical mechanisms leads to, or contributes to, change in more distal outcomes (e.g., use of social skills). Such questions call for sophisticated research designs that control for other possible change processes and establish temporal precedence in the candidate mechanism of action. Related to the second domain, there is terrific variability across categories of social intervention research. School-based research, for instance, in this area has closely examined the degree to which taught skills generalize to novel stimuli and settings. Other areas (e.g., cognitive-behavioral interventions) have dedicated less attention to generalization. Finally, with respect to the scope of external evaluation, most work on these interventions has been conducted by, or in close affiliation with, the labs that developed the interventions. This is not a criticism so much as a reflection of the nascency of much of this research. Replication and extension of existing programs (at nondevelopment sites), as well as multisite outcome evaluation studies, are needed.

In addition to these broader domains, the impact of much of the published research is hampered by methodological constraints such as small sample sizes and reliance of questionnaire data for outcome measurement. It should also be noted that many of the discussed interventions are multicomponent in nature (e.g., targeting discrete skills and FER), such that dismantling rela-

tive impact of the intervention's component parts is complicated.

Clinicians have many options from which to select, when targeting social impairment in clients with ASD. As discussed in this chapter, there are multiple available approaches which have an emerging research base to suggest efficacy. However, given that these approaches are not yet considered "established," clinicians must exercise caution and provide information about the limitations of the respective research base, as well as the relative and potential merits of the interventions to clients, in the interest of fully informed consent. Additionally, across the different categories of intervention reviewed herein, a multitude of outcome measures have been used. Selection of appropriate and clinically valid measures of change can be challenging, as we lack consensus on "gold standard" tools for many of the targets of intervention (e.g., FER, perspective-taking). Nevertheless, it is imperative that outcome monitoring be used to guide treatment planning and evaluation of progress with clients.

In conclusion, there are many exciting intervention avenues being actively explored. There is growing recognition that the social impairment that characterizes ASD is both profound and pervasive, regardless of the cognitive or verbal abilities of the client. Simultaneously, the nature of the social impairment is variable across affected individuals, as well as within a given person over the lifespan. As the field matures in knowledge base and research sophistication, it is likely that we will be able to provide research-based answers to the age-old questions of what works, when, and for whom.

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