Performance- and Theater-Based Interventions for Supporting Social Cognition and Social Communication in Autistic Youth: A Review and Theoretical Synthesis

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ABSTRACT

Social skills interventions (SSIs) are commonly used to improve social functioning in youth with autism spectrum disorder (ASD), which is a condition characterized by differences in social cognition and social communication. Although more traditional SSIs have used knowledge-based, didactic instruction, recent research has explored the utility of performance-based SSIs, which use various activities to support implicit learning of social skills in supportive, enriched environments. This article reviews the extant literature evaluating the effectiveness or efficacy of five performance-based SSIs using theater-based approaches on social cognition and social communication. Overall, this body of literature suggests social communication gains that include increased peer interactions, peer liking, and reciprocal friendships, as well as social cognitive gains in theory of mind and affect recognition. This review also discusses theoretical models that may help explain the emerging strengths of performance- and theater-based SSIs with underlying hypotheses related to the social communication and social cognitive differences in ASD. Limitations of performance-based SSIs in the evidence-base include

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several approaches in initial stages of research with small sample sizes and limited maintenance of effects. Future research should aim to bridge the research-to-practice gap and use more rigorous designs and more diverse samples, including those with cooccurring intellectual disability.

KEYWORDS: social skills interventions, social communication, social cognition, autism spectrum disorder, performance-and theater-based social skills interventions

Learning Outcomes: As a result of this activity, the reader will be able to (1) describe social skills interventions and contrast between knowledge-based and performance-based social skills interventions; (2) consider several performance- and theater-based social skills interventions with empirical support; (3) evaluate social cognition and social communication outcomes for autistic individuals following performance- and theater-based social skills interventions.

Autism spectrum disorder (ASD)[a] is characterized by differences in social communication, such as altered social–emotional reciprocity and difficulties in developing peer relationships, and restricted interests and/or repetitive behaviors, which may include vocal and/or motor stereotypy.[1] Recent prevalence estimates suggest that ASD is diagnosed in 1 in 44 children[2]; those diagnosed with ASD may manifest a range of speech and language difficulties, such as expressive and receptive language deficits and impairment in pragmatic language.[3,4]

Social communication and social interaction difficulties involving reciprocal communication, using nonverbal communication, and developing peer relationships are commonly seen in youth with ASD, and are closely related to differences in social cognition. Social cognition broadly includes affect recognition, theory of mind (ToM), and formal social knowledge (e.g., social norms; knowledge of what the appropriate social behavior is in a given social situation).[5–8] Affect or emotion recognition is the ability to identify emotional states based on visual and auditory nonverbal cues.[9] Deficits in affect recognition may predict ToM deficits in autistic individuals.[10] ToM is the ability to infer, comprehend, and reason about the mental and affective states of self (intrapersonal ToM) or others (interpersonal ToM); this is also referred to as perspective-taking.[11–14] Individuals with ASD have ToM impairments compared with age-matched typically-developing (TD) peers that have been attributed to differences in social information processing.[5] Social information processing is an essential component of social cognition which encompasses a combination of important skills like social problem solving and comprehension of implicit and explicit verbal and social cues, and impacts acquisition of social knowledge.[15] Although TD individuals develop these skills from sociocultural learning experiences in daily life, autistic individuals often need support to acquire these skills and apply them in social settings.[16] Without the development of these skills, individuals with ASD may have difficulties forming friendships, understanding social environments, and navigating real-world social situations. Furthermore, due to these differences, autistic individuals are at risk for peer rejection and social isolation, which may contribute to lasting mental health difficulties in this population.[17] Therefore, it is important to address these differences in social development to mitigate risk and improve long-term outcomes.[18,19]

Social skills interventions (SSIs) are among the most commonly-used intervention approaches for improving social functioning in youth with ASD.[20] SSIs provide support around social communication skills and seek to improve

[a] *We utilized both person-first (e.g., person with autism) and identity-first language (e.g., autistic person) in this paper in deference to the current disunity in the field regarding referents and ASD.*

social cognition.[21] Overall, both individual and group-based SSIs have shown promise for improving social skills in youth with ASD as summarized in several review articles.[18–20,22] A recent meta-analysis by Gates and colleagues[18] examined the *efficacy* (i.e., the examination of a treatment under a controlled circumstance, randomized controlled trials [RCTs]) of SSIs in group format, indicating an overall medium effect. Many group-based SSIs also demonstrate *effectiveness* (i.e., examination of the intervention's outcomes in a community or uncontrolled setting) for improving social skills, with some secondary effects such as improved psychological well-being.[23] However, the effects appear to differ by informant: while effects were largest for self-report, they were attributable entirely to improved social knowledge, not self-reported change in social behavior. These findings pose questions as to whether different approaches in teaching social skills may affect changes in social knowledge versus social behaviors.[18]

SSIs can take different forms depending on the specific target skills and instructional methodologies used. The two most popular approaches are (1) structured learning or knowledge-based SSIs and (2) performance-based SSIs (PBSSIs). The former approach is more traditional and focuses on didactic, explicit teaching in individual or group formats. These SSIs resemble an instructional setting (e.g., classroom) where topics covering multiple domains of social functioning are reviewed, followed by a practice and a feedback component with a clinician (e.g., role-play, rehearsal).[24,25] By contrast, PBSSIs are typically conducted in a group format where social skills are implicitly learned through spontaneous peer interactions by engaging in fun activities together in a supported environment, rather than through didactic instruction.[26] One of the defining features of PBSSIs is the emphasis on tapping into the intrinsic motivation of the participants during peer interactions, hence making the social interaction more motivating and reinforcing.[9] Although social knowledge-based SSIs teach specific target skills such as appropriate behaviors in social contexts (i.e., social knowledge training) with predetermined structured activities, PBSSIs incorporate interest-based learning without needing to modify the content of the intervention, resulting in a more flexible approach. Moreover, children with ASD may have special interests (e.g., cartoon characters, tangible items) which could be intrinsically motivating for them that can easily be integrated as part of PBSSIs. This, in turn, may lead to increased treatment efficacy and effectiveness.[9] In short, PBSSIs aim to provide an enriched environment that successfully promotes and reinforces naturalistic peer interactions.

While PBSSIs vary in terms of activities or strategies used (e.g., play-based activities, games, sports, music, and/or dance), one set of PBSSI strategies that has gained more attention with a growing body of literature is *drama- or theater-based approaches*.[20,26–30] Training in acting techniques has many parallels with the skills targeted in SSIs: theater/acting activities naturally provide an opportunity for social interaction. Furthermore, theater and acting activities involve perceiving and interpreting social information from others and responding to it, as well as paying attention to how oneself expresses ideas. Additionally, acting games and improvisation can theoretically promote imagination and cognitive flexibility.[28,31] Notwithstanding the efficacy and effectiveness of these theater-based SSIs (TBSSIs) as reported in the extant literature, no review to date specifically focuses on synthesizing social cognition and communication outcomes of empirically validated TBSSIs. Therefore, the aims of this review article are to (1) identify and describe TBSSIs that have been evaluated in the extant literature and (2) characterize the evidence of TBSSIs for supporting specific aspects of social cognition and social communication in individuals with ASD.

METHOD

Identification of Studies

An examination of extant literature was performed to identify relevant studies for this review. PsycInfo, PsycArticles, and PubMed databases were searched from the start of the database until August 2021. The search was conducted using terms referencing ASD (i.e., autism, autism spectrum disorder, Asperger, pervasive developmental disorder), social skills and related

constructs of interest (i.e., social skills, social cognition, social communication, peer relationships, social competence), and key types of treatments (i.e., performance-based, theater-based interventions). The following Boolean string was utilized: *(ASD OR autism spectrum disorder OR Asperger OR autis* OR pervasive developmental disorder) AND (social skills OR social cognition OR social communication OR social OR peer relationships OR social competence) AND (theater based OR performance based OR improv OR theater-based treatment OR theater-based intervention OR theater-based therapy OR performance-based treatment OR performance-based intervention OR performance-based therapy*). Data management was conducted using the Rayyan reference manager software and Microsoft Excel.

Study Selection and Literature Search

The following inclusion criteria were used in the title and abstract and full-text review process: (1) articles were original empirical research in a peer-reviewed journal; (2) written in the English language; (3) included a sample of participants meeting DSM-V or DSM-IV criteria for ASD diagnosed by either a clinician or a standardized measure for ASD (including ASD, autism, Asperger's disorder, pervasive developmental disorder—not otherwise specified); (4) included a TBSSI, defined by the study team and previous literature as a targeted SSI that provided implicit learning of social skills in an unstructured setting, specifically using drama, improvisation, and other theater-based techniques[32,33]; (5) included quantitative data specifically on social communication (e.g., reciprocal communication) or social cognition (e.g., ToM), as measured by behavioral tasks and parent-, self-, or observer-report questionnaires; and (6) was not music therapy, dance therapy, or early intervention: these categories of interventions were excluded due to the differing goals of the treatments (e.g., to improve general emotional well-being) and the lack of explicit focus on improving social skills competence, the significant variability between interventions, and the lack of specific theater- and drama-based social skills components (i.e., theater elements, improvisation, development of social play). After removal of duplicate articles, a team of three independent reviewers conducted title and abstract review, with excellent interrater agreement (97.2%) on decisions on inclusion of articles on 20% of screened articles. The full-text review was performed independently by four authors to ensure accurate inclusion. Any disagreements between reviewers were discussed and resolved by group consensus and through consultation with the last author. Finally, a backward search of the reference list for the included articles and a forward search were conducted to ensure all available articles were included in the review.

RESULTS

Overview of Identified Studies

The search yielded 963 articles, of which 59 were included for full-text review. Eleven articles met criteria and were included in this review (Table 1). The selection process is reported in the flow diagram (Fig. 1).

Five named (i.e., identified by the authors as denoting a specific approach) TBSSIs were identified from the search: Social Emotional NeuroScience Endocrinology (SENSE) Theatre, Socio-dramatic Affective-relational Intervention (SDARI), Imagining Autism, the Hunter Heartbeat Method, and the Social Competence Intervention Program (SCIP). All identified interventions included well-characterized autistic samples, with 7 out of 11 studies using the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2),[34] a gold-standard autism diagnostic tool, to confirm ASD diagnosis.[35] Four articles utilized a record review of clinician diagnosis to confirm diagnosis of ASD.[16,27,36,37] All identified interventions are intended for individuals with autism between the ages of 6 and 17 years. The characteristics and findings from the identified studies are described later.

Social Emotional NeuroScience Endocrinology Theatre

Description. SENSE Theatre is a 2- to 12-week, peer-mediated theater-based intervention developed specifically for youth with ASD that has taken place in various settings,

Table 1 Summary of Included Studies of Performance- and Theater-Based Social Skills Intervention

Author	*N*	Age and IQ	Intervention name and study design	Social communication outcome measure	Social cognition outcome measure	Results	Authors' conclusions
Corbett et al[33]	*N* = 8 (7 males)	**Age** ASD: *M* = 11.30, *SD* = 3.98 Range: 6–17 y **IQ** *M* = 82.36, *SD* = 16.44	SENSE Theatre Pre-post uncontrolled	SRS; SSP; Adaptive Behavior Assessment System	NEPSY-II: AR, MF, ToM	Improvements in memory for faces (*d* = 1.68) and ToM skills (*d* = 1.44). No significant results for affect recognition (*d* = 0.62) or parent-reported measures of sensory sensitivity, adaptive behaviors, and autism severity	SENSE Theatre has the potential to improve social communication and social cognition differences in youth with ASD
Corbett et al[39]	*N* = 12 (9 males)	**Age** *M* = 12.17 Range: 8–17 years **IQ** *M* = 82 (74 -118)	SENSE Theatre Pre-post uncontrolled	SRS; SCQ; Adaptive Behavior Assessment System; companionship scale; PIP	NEPSY-II: AR and MF (immediate and delayed)	Participants displayed improvements in peer engagement (companionship scale), social awareness (SRS; *d* = 0.23), social cognition (SRS; *d* = 1.46), memory for faces delayed (NEPSY-II; *d* = 0.89), parent-reported home living (ABAS; *d* = 0.34), and self-care (ABAS; *d* = 0.29). No effect for home-based communication and social domains (ABAS; *d* = 0.28, 0.09, respectively), amount of eye contact, affect recognition (NEPSY-II; *d* = 0.18), immediate memory for faces (NEPSY-II; *d* = 0.51), or cooperative play (PIP)	SENSE Theatre increased peer interaction and was associated with improvements in social awareness, social cognition, and facial processing. SENSE Theatre has the potential to reduce core social differences related to ASD
Corbett et al[28]	*N* = 30 (TG = 17; WLC = 13)	**Age** SENSE: *M* = 11.27, *SD* = 2.51 WLC: *M* = 10.74, *SD* = 1.89 Range: 8–14 y **IQ** >70	SENSE Theatre Pre-post follow-up WLC	SRS; PIP; ABAS	NEPSY-II: ToM and MF (immediate and delayed)	Significant improvements in social communication at post-test (SRS; *d* = 0.86) and follow-up (*d* = 0.82). Improvement in daily social functioning (ABAS) at post-test (*d* = 0.77; not maintained at follow-up), and group play (*d* = 0.77). Significant improvements in contextual ToM (*d* = 0.99) but not verbal ToM (NEPSY-II). Improvement in immediate memory for faces (*d* = 0.75; marginal), delayed memory for faces (*d* = 0.98), and ERP measure of incidental memory for faces (*d* = 0.93)	SENSE Theatre improves social communication and social interaction, facial memory, and theory of mind
Corbett et al[29]	*N* = 77 (TG = 44; WLC = 33)	**Age** SENSE: *M* = 11.12, *SD* = 2.54 WLC: *M* = 10.58, *SD* = 2.32 Range: 8–14 y **IQ** >70	SENSE Theatre Pre-post WLC	PIP	NEPSY-II: ToM; incidental face paradigm	Significant group differences were noted during solicited play (*d* = 0.58), but not unsolicited play (*d* = 0.48). There were increased verbal interactions during solicited play (*d* = 0.47; cooperative play [PIP]). Significant group differences were also noted in ERP markers of incidental face memory and verbal ToM (NEPSY-II; *d* = 0.45), but not in contextual ToM (NEPSY-II; *d* = 0.38)	SENSE Theatre improves several aspects of social cognition, such as theory of mind, and social communication in youth with ASD

(Continued)

Table 1 (*Continued*)

Author	*N*	Age and IQ	Intervention name and study design	Social communication outcome measure	Social cognition outcome measure	Results	Authors' conclusions
Ioannou et al[40]	*N* = 77 (59 males; all ASD) (TG = 44; WLC = 33)	**Age** Range: 10–17 y **IQ** >70	SENSE Theatre Pre-post WLC	PIP	–	Improvement in solicited group play and individual play (i.e., individual play decreased). No differences in unsolicited group or solitary play (PIP). Significant reductions in trait (but not state anxiety) in the treatment group at post-test following group play	SENSE Theatre contributes to an improvement in social abilities and a reduction in trait anxiety for youth with ASD
Lerner et al[37]	*N* = 17 (14 males) TG = 9 (8 males) Control = 8 (6 males)	**Age** SDARI: *M* = 14.31, *SD* = 1.328; Control: *M* = 14.32, *SD* = 1.931 Range: 10–17 y **IQ** N/A	SDARI Pre-post follow-up nonrandomized control	SSRS; SRS; EDI; Child Behavior Checklist	DANVA-2	Increased social assertion and emotion recognition in adult voices. Reduced social problems at follow-up. No effect for parent-reported overall social skills, nonverbal communication, parent- or self-reported internalizing and externalizing problems	SDARI is effective for addressing areas of social skills development for youth with ASD, and some effects seem to be sustained during the follow-up period
Lerner and Mikami[7]	*N* = 13 (all male) SDARI: *n* = 7 Skillstreaming: *n* = 6	**Age** SDARI: *M* = 10.86, *SD* = 1.68; Skillstreaming: *M* = 11.33, *SD* = 1.63 **IQ** N/A	SDARI Pre-post RCT	SCQ; SRS; SIOS; participant sociometric nominations		Relative decrease in social preference (η^2 = 0.70) than Skillstreaming. More general interaction in SDARI participants at Session 1 but decrease over time (*d* = 1.80) compared with Skillstreaming. Significant improvements in reciprocal friendships (η^2 = 0.31) and social skills (η^2 = 0.59) for both groups over time, but no between-group differences over time in these domains. No effect for parent-reported social behavior	Due to its reinforcing nature, SDARI promotes rapid peer liking and social interaction, with very slight decreases in these domains over time
Marro et al[26]	*N* = 69 (49 males) *Study 1*: *n* = 56 (40 males) *Study 2*: *n* = 13 (9 males)	**Age** *Study 1:* *M* = 12.376, *SD* = 2.90 *Study 2:* *M* = 13.25, *SD* = 2.14 **IQ** >70	SDARI *Study 1:* RCT *Study 2*: pre-post uncontrolled	–	CABS; TASSK; ToMI-2; DANVA-2	*Study 1:* Improved social cognition and ToM at post-test, but not emotion recognition. *Study 2*: Improved ToM and emotion recognition post-test, but not social cognition	SDARI improves social cognition, ToM, and FER. Specific gains depend on the setting in which the intervention is conducted
Beadle-Brown et al[30]	*N* = 22 (18 males)	**Age** *M* = 9.16 Range: 7–12 y **IQ** Range: 29–87	Imagining Autism Pre-post follow-up Uncontrolled	ADOS-2; VABS; researcher-created parent and teacher Likert-type measure to assess ASD impact; parent and teacher interviews	FER: modified version of the Ekman (1993) faces task	Reduced autism severity as per parent and teacher interviews and per ADOS-2, improved reciprocal social interaction (*d* = 1.96), and improvements in parent-reported socialization (VABS; *d* = 3.42) and communication (VABS; *d* = 6.07). Emotion recognition improved from baseline to follow-up (*d* = 2.12), but not from pre- to post-test	Imagining Autism is a feasible and enjoyable intervention for children with ASD

Table 1 (*Continued*)

Author	*N*	Age and IQ	Intervention name and study design	Social communication outcome measure	Social cognition outcome measure	Results	Authors' conclusions
Mehling et al[45]	*N*= 14	**Age** *M* = 12.42 **IQ** N/A	The Heartbeat Method Pre-post Uncontrolled	ADOS-2; VABS; Test of Pragmatic Language-2; Social Validity Questionnaire	Penn Facial Recognition Task	Improvements in socialization (VABS), expressive language (VABS), and relationships (VABS) and improvement in pragmatic language. No effect for FER for the whole sample, but subgroup with lower scores at baseline did improve (*n* = 7)	The Heartbeat Method is effective for improving domains of socialization and communication, as well as improving pragmatic language
Guli et al[27]	*N* = 34 (28 males); ASD = 18; NLD = 8; ADHD = 8	**Age** ASD: *M* = 10.97 Range: 8–14 y **IQ** >80	SCIP Pre-Post WLC	SSRS; Behavior Assessment System for Children; observed social interaction (positive interactions and solitary behaviors); social validity semistructured interviews (parent and child)	DANVA-2 (child faces and child voices)	Improvement in positive interactions and decrease in solitary play. Parent- and child-reported improvements in social cognition and social communication. No effect for social and behavioral adjustment or nonverbal cue reading	SCIP can effectively address difficulties with social competence in children with ASD and related disorders

Note. ABAS, Adaptive Behavior Assessment System; ADHD, Attention-deficit/hyperactivity disorder; ADOS-2, Autism Diagnostic Observation Schedule- 2; AR, Affect Recognition; ASD, autism spectrum disorder; BASC, Behavioral Assessment System for Children; CABS, Children's Assertiveness Behavior Scale; CBCL, Child Behavior Checklist; DANVA-2, Diagnostic analysis of nonverbal accuracy- 2; EDI, Emory Dyssemia Index; ERP, Event Related Potential; FACT, Fun Activities for Children and Teens; FER, facial emotion recognition; MF, Memory for Faces; NEPSY-II, A Developmental NEuroPSYchological Assessment; NLD, Nonverbal Learning Disability; PIP, Peer Interaction paradigm; RCT, Randomized Controlled Trial; SCQ, Social Communication Questionnaire; SCIP, Social Competence Intervention Program; SDARI, Socio-dramatic affective-relational intervention; SIOS, Social Interaction Observation System; SSP, Short Sensory Profile; SSRS, Social Skills Rating System; SRS, Social Responsiveness Scale; TASSK, Test of Adolescent Social Skills Knowledge; TG, Treatment Group; ToM, Theory of Mind; ToMI, Theory of Mind Inventory; VABS, Vineland Adaptive Behavior Scale; WLC, Wait list control.
d = Cohen's *d*, an effect size measure that indicates the standardized differences between means such that 0.2 constitutes a small effect while 0.5 corresponds to a medium effect size, and 0.8 indicates a large effect size.[72]
η^2 = eta squared, an effect size measure that represents the proportion of variance in the dependent variable that is accounted for by the independent variable. For this metric, 0.01 indicates a small effect, 0.06 indicates a medium effect, and 0.14 indicates a large effect.[72]

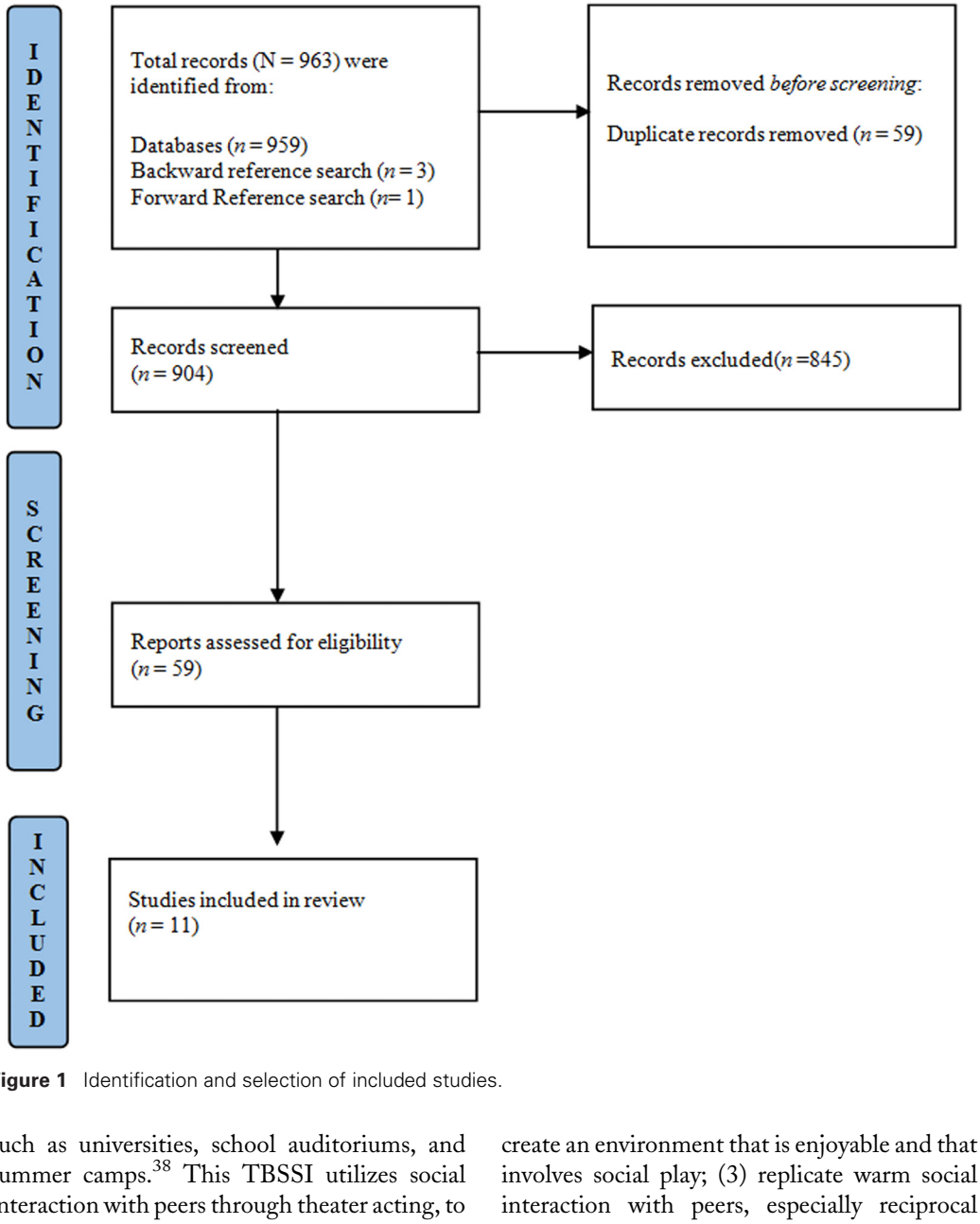

Figure 1 Identification and selection of included studies.

such as universities, school auditoriums, and summer camps.[38] This TBSSI utilizes social interaction with peers through theater acting, to target core differences associated with ASD, such as ToM, social communication, and flexible and imaginative thinking.[28] The process of acting involves many essential aspects of social communication such as socializing, perceiving emotion, and thought expression, which allows participants to learn these skills through theatric approaches.[28] The 10 core objectives of SENSE Theatre intervention are to (1) provide social support in the form of building trust; (2) create an environment that is enjoyable and that involves social play; (3) replicate warm social interaction with peers, especially reciprocal interactions; (4) enhance motivation (increase social initiation); (5) engage in directed, reciprocal communication; (6) utilize nonverbal communication skills (improving eye contact, facial expressions, and gestures); (7) engage in imaginative play; (8) respond to others empathically; (9) support active learning by introducing novelty and encouraging participation; and (10) advance individual learning by using social knowledge to inform social behavior.[39]

SENSE Theatre seeks to address differences that are characteristic of ASD utilizing specific techniques such as role-playing, improvisation, and character development.[39] Initial sessions include theater games and imaginative play, while subsequent sessions include encouraging the participant to think about the development of a character. The intervention culminates in a public performance of the play.[28,29,39] Notably, a unique aspect of this intervention is pairing individuals with ASD with a TD peer that has received training about ASD, the intervention, and approaches for addressing behavioral challenges they may experience when working with autistic peers. These trained TD peers provide real-time, naturalistic models of reciprocal social communication skills to facilitate generalization of learned skills.[28]

Current empirical evidence. To date, five studies have been conducted examining the effects of SENSE Theatre across a range of development periods, with each displaying some specific and general improvements in social cognition and communication.[28,29,33,39,40]

The first study examining SENSE Theatre was an uncontrolled pilot study, conducted with participants aged 6 to 17 years with ASD across a period of 3 months. Participants completed between one and four sessions, for approximately 2 hours per week depending on their role in the play, which was performed for the public. Participants showed improvements in face identification and memory (i.e., a measure for identifying familiar vs. novel faces following a delay), as well as some improvement in ToM skills from pre- to post-intervention (Table 1). No improvements were observed from pre- to post-treatment in affect recognition, parent-reported adaptive behaviors, or ratings of autism severity.[33]

A subsequent uncontrolled study ($N = 12$; 8–17 years old) was conducted during a 2-week (4 hours per day; 5 days/week) summer camp followed by two public performances. Results from this study indicated increases in overall ASD symptoms, specifically in social awareness and social cognition, and active engagement with peers as well as specific increases in *delayed* face identification memory (Table 1). However, there were no effects of treatment on eye contact, affect recognition, *immediate* facial identification memory (i.e., recognizing a previously seen faces following a brief 5-second initial exposure), or parent-reported adaptive functioning in the domains of communication and social functioning.[39]

Two RCTs have been conducted to examine the efficacy of SENSE Theatre in a summer camp setting (4-hour weekly sessions for 10 weeks, followed by two public plays).[28,29,40] The first RCT was conducted with 30 autistic children (treatment: $n = 17$; waitlist control [WLC]: $n = 13$) aged 8 to 14 years. Participants displayed improvements in parent-reported ASD-related social communication skills as well as daily social functioning. Notably, changes in social communication were maintained at 2-month follow-up, but changes in social functioning were not maintained. When assessing social interaction variables, improvements were found in the children's play with peers. Participants also improved in several social cognition domains, including *contextual* ToM, which refers to one's ability to relate emotionally to a social context, demonstrating the skills to comprehend another individual's emotional experience.[28] Additionally, participants in the treatment condition displayed improvements in both *immediate* (marginal) and *delayed* facial memory.[28]

In a subsequent RCT, SENSE Theatre was conducted with 77 autistic children and adolescents 8 to 16 years of age (treatment: $n = 44$; WLC: $n = 33$). Participants in the treatment group evinced improved performance in *verbal* ToM, which refers to the understanding that another person's thoughts and feelings may be independent from one's own (e.g., false-belief tasks, understanding figurative language). However, no improvements in *contextual* ToM were noted. Increased neural evidence of memory for face as indexed by electroencephalogram (EEG) was displayed in the treatment group.[29]

Additional findings from this RCT study demonstrated that children in the treatment group exhibited increased engagement with peers and less individual play when invited by a confederate (solicited play). There were no differences between groups in unsolicited play (initiated by the participant, but not invited by a confederate).[29,40] Additionally, the treatment group showed greater improvement in trait but

not state anxiety following a group play with new children.[40] As social interaction may be a source of increased stress for individuals with ASD, it is notable that this intervention has been shown to reduce the level of stress and anxiety in individuals with ASD.

Overall, SENSE Theatre appears to be both efficacious and effective for treating particular aspects of social communication and social cognition in children with ASD. These include improvements in ASD-related social communication, social awareness, more frequent peer interactions, and *delayed* face identification and memory, which was corroborated by changes in neural index of face memory.[28,29,39,40] Findings were mixed across studies in terms of results related to parent-reported adaptive functioning (including social functioning and communication), different types of ToM (e.g., *contextual* vs. *verbal*), and *immediate* facial memory. However, there were other aspects where no change in symptoms was evinced, including eye contact,[39] unsolicited group and self-play,[29,40] and affect recognition.[33,39]

Socio-Dramatic Affective-Relational Intervention

Description. SDARI is a TBSSI that utilizes specialized games and age-appropriate motivators to foster social motivation and creativity to provide positive social reinforcement and relationship-building opportunities in children and adolescents with ASD.[31,37] The SDARI approach is highly adaptable and uses activities that intrinsically motivate participants so as to create situations that more closely parallel authentic interactions in social contexts. SDARI's games target skills including perspective-taking, nonverbal communication, interpretation of others' body language, and cooperation, and is selected based on age and interest of group members to maximize engagement.[31] For example, in a game called "gibberish," one participant speaks in nonsensical sounds while "describing" how to perform a common task. Another participant must watch and then translate the gibberish into words for the other participants.[37] In this game, participants are encouraged to interpret the subtle nonverbal information being conveyed by the first participant to translate the message. In this way, the SDARI approach more closely parallels authentic interactions in social contexts.

SDARI can be delivered in both laboratory-based, controlled environments and community-based settings, and has been flexibly implemented with high fidelity (i.e., while maintaining adherence to the manualized approach and conceptual principles of the intervention) across a wide range of formats, from 4 sessions (90 minutes)[7] to 10 sessions (also 90 minutes each), as well as a 6-week summer camp (e.g., 5-hour, daily sessions).[26,37]

Current empirical evidence. Three studies have been conducted to explore the effectiveness of the SDARI protocol in areas related to social cognition and communication differences.[7,26,37]

The first study of SDARI was a controlled pilot study that assessed 17 participants (treatment: $n = 9$; no-intervention control: $n = 8$) aged 11 to 17 years old, where the treatment group participated in a 6-week summer camp version of SDARI.[37] Effects of treatment were examined at post-intervention and at a 6-week follow-up. Post-intervention improvements were reflected in increases in parents' reports of their children's assertion and improvements in the performance on the vocal emotion identification task, which were maintained at follow-up. Although not significant at post-treatment, parent-reported social problems (i.e., peer rejection and teasing) were significantly improved at follow-up, suggesting a delayed effect of treatment. Social cognition outcomes measured using a vocal emotion recognition task also improved at post-treatment and follow-up. No effect for other measures of social skills or ASD-like nonverbal communication skills was observed.

In a subsequent RCT,[7] 13 participants were randomly assigned to either SDARI ($n = 7$) or Skillstreaming ($n = 6$), which is a didactic, knowledge-based SSI. The duration of the intervention was one 90-minute session per week for 4 weeks. Participants' social interactions, as assessed by behavioral coding, reflected decreased positive and negative interactions in SDARI participants compared with Skillstreaming,[41] while on the sociometric outcomes, both groups increased in reciprocated friendship. Additionally, the Skillstreaming group

increased in social preference such that, on average, peers rated these children as more liked than disliked.[42] Lastly, there were no group differences in parent-reported social skill or autism severity.

Marro and colleagues[26] further explored the effects of SDARI on social knowledge in two concurrent studies. The first, as part of a laboratory-based randomized controlled efficacy trial ($N = 56$), participants completed SDARI and another PBSSI delivered for 90 minutes each week over 10 weeks. Data collected at post-intervention and at 10-week follow-up evinced improvements in formal social knowledge measures as well as ToM, but no effects were observed for facial emotion recognition (FER). In the second, uncontrolled study from Marro and colleagues,[26] 13 youth participated in a community-delivered SDARI. Data at post-intervention showed improvements in participants' FER and ToM, but no effects were observed for formal social knowledge (i.e., explicit knowledge of social etiquette).[26]

Results from these studies indicate that PBSSIs such as SDARI positively impact social knowledge, ToM, nonverbal communication, social preferences, reciprocated friendships, and emotion recognition both in the short term and with some maintained effects. However, across studies there appear to be some mixed results depending on treatment setting or dosage with regard to social cognition and social communication outcomes. In addition, SDARI seems at least as effective as more structured, knowledge-based approaches at promoting reciprocated friendship and is associated with more immediate gains in interaction and social preference than such approaches. Taken together, results from these studies suggest that SDARI effectively improves several areas of social communication and social cognition for autistic youth; however, some gains may be limited to specific setting or dosage in which SDARI is administered.[7,26,37]

Imagining Autism

Description. Imagining Autism is a 10-week intervention focused on extending traditional social skills treatments through immersive learning using imaginative play in autistic school-aged children (7–12 years).[30] Children participated in groups of three to four children with a 1:1 ratio of group facilitators, for 45 minutes per week within a school. The interventions are conducted in immersive "pods" (i.e., decorated themed areas) that rotate between five environments (i.e., under the sea, space, under the city, arctic, and in the forest), twice per environment throughout the 10 weeks. Interventionists craft and facilitate a story based on the theme, giving opportunities for the children to spontaneously narrate and participate in the story. Practitioners encourage turn taking, improvisation, and "being in the moment" during the experience. All of these activities are designed to facilitate imagination, social communication, and interactive play.[30]

Current empirical evidence. One study has been conducted to examine the feasibility of the Imagining Autism protocol using an uncontrolled pre-post design. Results from this study in a group of 18 autistic children report preliminary evidence for improving social communication and social cognition outcomes. It is noteworthy that modules 1 to 3 from the ADOS-2[43] were administered to the participants based on their language level in the study. No statistically significant differences were noted between pretest and posttest scores on the communication or creative/play subdomains of the ADOS-2 for all children. For children who had minimal or limited language abilities (i.e., modules 1 and 2 on the ADOS-2), the reciprocal social interaction subdomain of the ADOS-2 was not significant. However, for children who had flexible, verbally fluent language (i.e., who completed module 3 on the ADOS-2), significant pre-post improvements were noted in the reciprocal social interaction subdomain. Additionally, when examining single subjects through a confidence interval analysis (one statistical method for pilot studies), the communication subdomain ($n = 4$) and reciprocal social interaction subdomain ($n = 7$) evinced improvements from pre- to post-intervention. Also, when examining ADOS-2 severity scores, there was a decrease in autism severity scores over time (from pre- to post-intervention and from post-intervention to follow-up) for those with flexible language. Participants also demonstrated significant improvements in FER between pre-intervention and follow-up (but not from pre to post).

Moreover, parent- and teacher-report reflects some positive improvements in ASD symptom severity. Furthermore, parent-reported adaptive behavior, specifically in communication and socialization domains, showed a significant increase from pretest to posttest (Table 1).[30]

Taken together, findings suggest that Imagining Autism results in improvements in socialization, communication, emotion recognition, and improvements in ASD symptoms. However, there were no improvements in the creativity and play skills, and areas that evinced some improvements may be limited to a subset of participants or show a delayed effect. Although this is the first study to examine Imagining Autism, preliminary results suggest that the intervention is associated with reductions in the social communicative symptoms of ASD; clearly, replication and extension of this study using more rigorous designs (to control threats to internal validity and the use of larger more diverse samples) is warranted.[30]

Hunter Heartbeat Method

Description. The Hunter Heartbeat Method is a 1 hour per week, 10-week intervention that utilizes drama games using Shakespeare's *The Tempest* to promote the development of social communication skills in children 10 to 14 years old.[44] Sessions are conducted in small groups (six to eight children) with a 1:3 ratio of children to facilitators to ensure each child is receiving individualized support and feedback. Intervention is conducted in school, often using school auditoriums to make use of the "stage" for the drama games. Each session begins with a "heartbeat circle," which marks the beginning of the activity and is intended to allow children time to orient to the social and instructional environment. Following the "heartbeat circle," children form dyads to practice and receive feedback on that day's game. Children "perform" the various games for the group, with each session consisting of five to seven games to reflect the plot of *The Tempest*. Following the games, children return to the floor for a "goodbye heartbeat" circle. Throughout the intervention, facilitators work to encourage affective imitation, turn taking, personal space, and eye contact. Additionally, facial emotional recognition, pragmatic language skills, humor, and improvisation are targeted and integrated into 1:1 practice sessions and the theater performances.[44]

Current empirical evidence. One study to date, using an uncontrolled pre-post design, has examined the feasibility of the Hunter Heartbeat Method in small group of 14 children in school setting. Children who participated in the intervention displayed improvements in socialization, expressive language, relationships (assessed through standardized parent-reported measure; Table 1), and pragmatic language abilities (assessed via clinician-administered standardized measure; Table 1).[45] However, there were no significant improvements from pre- to post-intervention in FER for the whole sample.[45] Of note, half of the participants ($n = 7$) had high FER scores at pre-intervention, such that significant amelioration may not have been possible due to a ceiling effect. Descriptive analysis excluding these seven participants revealed that for many of the remaining participants, the scores at post-test were improved, with four participants showing increased FER scores. Furthermore, anecdotal feedback from parents (as part of a social validity questionnaire) suggested increase in socialization in the home setting alluding to generalization of treatment gains (Table 1).[45]

Results from this study suggest the Hunter Heartbeat Program is associated with improved social communication in autistic children, specifically, in clinician- and parent-reported socialization, expressive language, relationships, and pragmatic language. Although the increase in pre-post scores was not significant (which may be due to limited statistical power owing to small sample size), this provides preliminary evidence that the Heartbeat Method may evince positive changes in FER for some participants. These results are from a single study examining the therapeutic potential of this intervention. More rigorous study designs using larger samples are needed to further explore efficacy and effectiveness.[44,45]

Social Competence Intervention Program

Description. SCIP is a 16-session, manualized intervention program that focuses on improving

social communication in a naturalistic setting, in children and adolescents aged 8 to 14 years, using drama-based peer interactions (e.g., games, story dramatization).[27] The initial sessions focus on *intrapersonal affective ToM* (i.e., understanding one's own emotions), followed by *interpersonal affective ToM* (i.e., understanding others' emotions).[11–14] The first seven sessions cover topics like establishing group cohesion, emotional knowledge, focusing attention, facial expression and body language, vocal cues, and putting several cues together.[27] The participants engage in games like "Say It With a Feeling" in which a single statement is expressed with varied emotions in multiple trials and the "audience" guesses the specific emotion. This exercise is intended to help participants better understanding subtle nuances of nonverbal communication (e.g., tone, prosody, facial expressions) and to support the reading of emotional state of others. A game called "Jell-O Room" is intended to support the understanding of body language, which is considered an essential component of social communication. During the "Jell-O Room" game, participants navigate a room while improvising, as if the room is inundated with emotions or tangible substances, using body language to express the feeling state.

The next five sessions focus on *cognitive* ToM which refers to the ability to infer mental states (e.g., thoughts, belief) of self or others.[13,46] The emphasis of these sessions is particularly on nonverbal cues. A drama-based teaching methodology called *process drama* is incorporated in this phase where potential interactions in a social situation are divided into less complex stages and relevant emotions are discussed in the context of nonverbal cues. In one such activity, "detective agency," participants enact a scenario where detectives (the participating children) and crime witnesses (the interventionists) adopt their respective roles to unravel a mystery plot. The last four sessions focus on teaching and honing skills related to functionally responding to peers in a social setting.[27,47]

Current empirical evidence. One study to date has assessed the effects of SCIP in a group of 34 children with ASD, nonverbal learning disability, or attention deficit hyperactivity disorder (ADHD) split into a treatment group ($n = 18$) and WLC group ($n = 16$).[27] Pre- and posttreatment observations of social interactions were conducted in a school setting for a 20-minute time interval for 17 (43.6%) of the total participants (8 from the treatment group). The treatment group (for which 11 had ASD) showed improvement in explicitly observed social behavior, specifically an increase in positive interactions and decrease in solitary play in comparison to the control group, but no significant group differences were observed for parent-reported social skills and social withdrawal (assessed via a parent-reported measure of social and behavioral adjustment), or FER (assessed through a computer-based measure of receptive nonverbal cues).[45] Participants in the treatment group and their parents completed a researcher-developed semistructured social validity interview assessing perceived efficacy of the intervention. Qualitative analyses revealed that parents reported positive outcomes, such as improved self-regulation, increased empathy, increased facial expressions congruent with mood, and better reciprocity in social interactions. Additionally, parents reported improvements in their children's understanding of nonverbal cues and body language. Furthermore, child participants reported positive changes in self-efficacy to decode nonverbal cues to comprehend feelings, initiate friendships, and the acquired ability to decipher incongruence in facial and verbally stated affect in others.[27]

Taken together, SCIP has shown promising results for improving social communication outcomes in a preliminary pilot study. The intervention evinced amelioration in observed social behavior in the treatment group. Notably, gains were not observed in FER and parent-reported social skills via standardized measures, but qualitative analyses revealed treatment gains in ToM and socioemotional reciprocity. Encouragingly, the intervention displays some generalization in treatment gains outside of the treatment setting as per parent reports, which is an integral aspect in maintaining the skills.

Other Intervention Approaches

Several other PBSSIs that are not theater- or drama-based were identified in the search but were not included in the review due to alternative

approaches or differing definitions of SSIs. Many of these interventions were conducted in a virtual environment where children participated in collaborative game play.[48–50] Similar to in-person PBSSIs, participants role-played, played virtual games with peers (i.e., building together, completing puzzles),[48,49] or participated in unstructured interaction with peers in a virtual reality environment meant to simulate in vivo social experiences.[49,51] These interventions were associated with improvements in social interaction, emotion recognition, and social communication skills.[48–50] Other interventions were focused on younger groups of children and were strictly unstructured play environments, such as playground-based play,[52] participation in team activities (e.g., basketball),[53] or play environments mediated by parents.[54] Playground-based interventions focused on allowing children to participate in free play with a playground facilitator who encouraged group play and provided group activities focused on the children's specific interests (i.e., a bug hunt).[52] Another play-based intervention utilized basketball to encourage communication and social interaction in the children through the sport.[53] Lastly, the youngest group of children participated in unstructured play with their parent in dyads where they were encouraged to communicate and interact with their caregiver.[54] These play-based interventions were associated with improvements in social behaviors such as social interactions, engagement, as well as improvements in repetitive behaviors.[52–54] Furthermore, numerous music and dance therapy approaches measured supplemental effects of social skills improvements, with both identified studies showing general improvements in social communication skills.[36,55] However, the goals of music and dance interventions are often not specific to improving social skills competence; rather, these effects are incidental improvements as these interventions tend to focus on general improvements in social and emotional well-being.

DISCUSSION

This review article identified five TBSSIs that have data regarding effectiveness or efficacy in improving social communication and social cognition in individuals with ASD in the extant literature: SENSE Theatre, SDARI, Imagining Autism, Hunter Heartbeat Method, and SCIP. In terms of outcomes related to social communication, these TBSSIs appear to be promising for improving socialization, social knowledge, peer relationships, peer liking, and social reciprocity. For instance, SENSE Theatre has demonstrated effectiveness in increasing global social communication symptoms, social awareness, and social interaction. Specifically, participants who completed the treatment displayed increased verbal involvement with peers and displayed increased solicited group play.[28,29,33] Still, results for daily social communication, functioning, and self-directed play were mixed, with some studies suggesting improvements, while others did not. Additionally, SENSE Theatre did not result in improvements in amount of eye contact, which is sometimes considered an important aspect of social communication.[39] Lack of improvements in some areas of social communication as well as the presence of mixed results could be related to smaller sample sizes in some studies that may lack power, or differences in treatment setting (i.e., afterschool vs. summer camp) and length or dosage (e.g., 2 vs. 10 weeks; 2 vs. 4 hour/week).

Research comparing SDARI to a didactic, knowledge-based SSI (Skillstreaming) indicated that even though both approaches were beneficial in improving social outcomes as reported by direct observation (for peer interaction, peer liking, and reciprocal friendships), SDARI showed immediate gains at post-intervention in these outcome variables compared with Skillstreaming.[7] It may be that intrinsically motivating activities of SDARI and the reinforcing nature of the peer interactions within the groups, compared with the didactic training in Skillstreaming, explains more immediate gains in peer liking. In addition to the aforementioned social outcomes, SDARI has been shown to be effective in increasing assertive social behavior, emotion recognition, ToM, and explicit social knowledge, although some of these effects may depend on treatment setting and/or dosage.[7,26,37] Notably, results from a 6-week follow-up also suggest that SDARI is associated with reduced social problems, indicating lasting effects of group involvement.

Researchers theorized that the combination of assertion and improved emotion recognition ability may lead to greater social confidence and accuracy in interpreting social situations, which in turn decrease social problems over time. However, some of these changes did not reflect improvements in broader parent-reported social behavior, suggesting the need to more fully examine maintenance or generalization of effects beyond treatment settings.

There is tentative evidence for additional TBSSI approaches, including Imagining Autism, which is shown to facilitate social communication and socialization in children with ASD.[30] However, the differential improvements noted in the participants suggest that changes in the assessed constructs may not be salient enough to be immediately observable by caregivers posttreatment. Alternatively, due to a small sample size, this feasibility study may have been underpowered to detect changes in some of the measures.[30] A small sample of children who participated in the Hunter Heartbeat Method displayed improvements in socialization, expressive language, relationships, and pragmatic language abilities, indicating preliminary effectiveness in treating social communication deficits.[45] Similarly, SCIP seems to show effects in improved social interaction and decreased solitary play as assessed by observations in the naturalistic setting (school) and coding of this observational data, while some of the parent-reported standardized measures (e.g., withdrawal and social skills domains) did not indicate pre- and post-changes. Likewise, parent- and child self-report gathered by semistructured interviews revealed a positive impact of intervention on social functioning (e.g., self-regulation, cognitive and affective ToM, empathy).[27] These differences can be attributed to methods variance related to assessing informant versus direct performance. Specifically, some of the measures may not be sensitive enough to assess changes in the constructs as compared with other measures.

Various TBSSIs appear to be promising approaches in terms of outcomes related to social cognition as well. SENSE Theatre has been reviewed in the context of several empirical studies examining improvements in both broader social cognition skills and more specific skills such as memory for faces and broad measurement of ToM. Specifically, SENSE Theatre produced mixed outcomes in contextual (i.e., relating to a social context or experience) versus verbal ToM (i.e., communication of internal emotions). In one study,[28] greater improvements in contextual ToM (i.e., relating to a social context or experience) were noted in the treatment group compared with waitlist control group.[28,33] However, results of another study[29] indicated amelioration in verbal ToM skills, as participants were able to communicate mental states to others, but not in contextual ToM in terms of emotionally relating to the social context of the event. These inconsistent findings could be due to the lack of specificity of the assessment used to measure the construct. For example, the use of more sensitive measures or a multifaceted evaluation of ToM skills, like the inclusion of false-belief understanding and/or pretend play skills, might lead to different results.[26,29] Additionally, consistent improvements were reported for face identification for memory for *delayed* recall, while mixed results were reported for *immediate* recall of faces. Furthermore, EEG-indexed neural evidence of memory for face was also shown in the treatment group. These findings suggest some differential treatment effects on social cognitive skills, which could relate to several factors, including varied session and treatment length. Lastly, some areas in which SENSE Theatre did not evince significant improvements (e.g., affect recognition) were assessed in two small groups of children and have not been examined in subsequent studies with larger group participation.[33]

Evidence for SDARI suggests that gains in social knowledge can be implicitly acquired by TBSSIs in autistic individuals.[26] It is noteworthy that even in the absence of didactic instruction, participants demonstrated gains in the higher ToM skills (e.g., sarcasm) and emotion identification, which are areas in which many autistic people require increased support. This suggests that a naturalistic treatment setting may be more conducive to improving emotion identification skills, but it also suggests that less-controlled, lower fidelity delivery of interventions may differentially impact treatment effectiveness (as demonstrated by lack of social

knowledge gains in the second study). Another notable finding is that effects may vary by dosage and/or format of the intervention delivered; in one study, which was laboratory-based, participants demonstrated improvement in social knowledge and ToM but *not* affect recognition, while in another study, which was community-based, gains in ToM *and* affect recognition were noted, but *not* formal social knowledge. Differential gains in social cognition, emotion recognition, and ToM may be related to the setting or dosage in which SDARI is administered, suggesting that these factors should be a focus of future research.

Finally, the two studies examining Imagining Autism and the Hunter Heartbeat Method assessed social cognition in smaller groups of participants and used non-experimental designs. Preliminary results from the Imagining Autism protocol showed that intervention was associated with improvements in social cognition. While FER improvements were not uniformly present at posttreatment, children presented with low pre-intervention scores demonstrated improvements at follow-up, suggesting this intervention may produce a delayed effect in higher level processing and recognition of emotion.[30] There were no significant social cognitive improvements following the Hunter Heartbeat Program, suggesting that some TBSSIs may differentially impact broader social communication but not specific aspects of social cognition that may underlie such changes despite similar measurement of the construct.[45]

Taken together, the evidence-base for TBSSIs is relatively sparse but growing. Extant literature is largely characterized by less rigorous designs with small sample sizes. Still, the evidence that is accumulating provides some proof of concept and justifies further examination of their therapeutic potential to establish causal linkages, identify active ingredients of treatment, and determine whether and which participant characteristics predict success with intervention. In general, TBSSIs appear to be promising for supporting in social communication outcomes including increased social interactions, reciprocal communication, and improved peer relationships. Furthermore, by providing socially safe and interactive spaces for practicing social communication with peers, constructs of social cognition appear to be positively affected by TBSSIs, including improved emotion recognition and ToM, which results in improved integration of learned and applied skills. However, many of the findings related to these outcomes were inconsistent across parent- and teacher-reported changes in behaviors, suggesting some of the improvements may not generalize across contexts. In light of the aforementioned small sample sizes, many of the studies reviewed may not been sufficiently powered to detect effects. This gains importance when considering the effect size estimates provided in the literature for some outcome variables of interest (see Table 1). Specifically, SENSE Theatre produced consistently large effects of improvements in social cognition (e.g., facial identification memory), whereas improvements in social communication were small to medium (e.g., ToM, group play) and inconsistent across studies.[28,29,33,39] SDARI produced medium-to-large effects for several social communication measures (e.g., participant interactions).[7] Imagining Autism produced large effects for both measured social communication (i.e., reciprocal communication) and social cognition (i.e., FER) for some participants.[30] These findings highlight the variability in outcomes between approaches, and underscore the importance of more closely examining effect sizes and the dosage required to establish a therapeutic effect, as well as the active ingredients of treatment that may be responsible for these changes.

Theoretical Considerations on Effects of TBSSIs

These findings suggest that mechanisms for social learning in youth with ASD may be mediated by specific content as well as individual differences, and can be supported through specific performance-based techniques when provided in a supportive context. This is contrary to the notion or assumption that they do not know the discrete steps of social interaction and cannot implicitly learn about social norms, rules, or conventions, unless they are taught explicitly using more traditional methods (e.g., like a classroom) in a didactic social skills curriculum. Indeed, in real life, social situations

rarely present themselves in an explicit and structured fashion, so it takes significantly more in vivo processes to use their available social cognition. As reviewed here, TBSSIs, which prioritize in vivo opportunities for social engagement, may help youth with ASD learn knowledge-based aspects of social cognition implicitly, rather than exclusively explicitly, and provide future directions to support learning of social skills.

Several prominent hypotheses may help explain deficits in social communication and social cognition in individuals with ASD, which, in turn, may form the basis of specific theoretical models of social functioning that may explain the effectiveness and efficacy of TBSSIs. For instance, Dissanayake and Macintosh[56] presented the *Hacking Hypothesis*, which states that some autistic individuals may "hack" out the mechanisms (i.e., rote learn) required to perform on the standard tasks (e.g., false-belief tasks in standard ToM assessments), which are not generalized to the real-world setting. That is, individuals with ASD may "hack out" superficial knowledge of social mores and prosocial behavior, and, therefore, may appear socially competent (e.g., in a knowledge-based SSI).[56] However, in line with the distinction that Gresham[57] made, those acquiring social knowledge (i.e., knowledge about the correct behavior in each social situation) may still demonstrate deficits in social performance (i.e., lacking the ability to apply social knowledge in real-life situations with peers or adults). It is plausible that TBSSIs provide social learning opportunities that go beyond traditional SSI for actually practicing and building skills in how to apply social knowledge. Indeed, theater-based activities inherently provide an opportunity for social interaction and engagement with others through various techniques, such as acting games that target perceiving and interpreting information from others and responding to it, and improve methods that enhance flexibility and imagination.

In a related vein, Jeste and Nelson[58] presented the *Attentional Hypothesis* (rooted in social motivation theory), which posits that individuals with ASD lack an innate preference to attend to social stimuli. Due to the heterogeneity of ASD, the variation in this type of preference may be prognosticative of social functioning. Similarly, Chevallier and colleagues[59] advanced the *Social Motivation Theory* which posits that individuals with ASD may not be motivated by social stimuli or social engagement and, therefore, selectively attend to environmental stimuli, which results in impairment in social functioning. However, the assumption that autistic individuals present with diminished social motivation may fail to account for the diverse ways in which autistic individuals express their social interest. It is important, therefore, to consider factors other than social motivation that could limit an autistic individual's ability to engage in behaviors that are typically thought to indicate social interest.[60] Thus, Jaswal and Akhtar[61] argued that attempting to instruct a behavior that is "conventionally interpreted as indicating social interest," such as making an eye contact, could paradoxically backfire when autistic children find engaging in such behaviors aversive with exaggerated bids from adults. Therefore, rather than didactically teaching autistic children to look other people directly in the eye, it may be important to provide natural and intrinsically motivating opportunities for joint attention and shifting gaze in the context of collaborative activities that provide context for shared positive experiences.

Taken together, the above hypotheses may form the basis of specific models of social functioning that could potentially explain therapeutic effects of TBSSIs. Klin and collegues[61] elucidated the Enactive Mind Model which highlights the development of social cognition via the interaction of the individual within their environment. Furthermore, Beauchamp and Anderson[62] stated that according to the Developmental Biopsychosocial Socio-cognitive Integration of Abilities (SOCIAL) model, social competence is determined by an interplay of cognitive (e.g., attention, memory, executive function), environmental (or external), and individual (or internal) factors. The variation in cognitive factors mediates the process of acquiring social competence. These models are in sync with the neuroconstructivist framework,[63,64] which underscores the importance of considering a multidirectional interplay among the developmental domains. Indeed, multiple

domains of functioning (e.g., language, cognition) are likely to synergistically influence social functioning in autistic individuals. This process may be further limited in individuals with ASD due to differences in social motivation and selective attention to social stimuli. However, improvements in social cognition evinced by TBSSIs are consistent with this notion that social cognitive processes are a result or *embodiment* of experiences of how individuals respond and act in social situations. These arguments underscore the theoretical potency of interventions providing in vivo opportunities for practicing and processing social situations to develop social competence more effectively.[7,16,20,26–30,33,37,40]

LIMITATIONS AND FUTURE DIRECTIONS

There are several limitations in the current literature surrounding TBSSIs. First, the identified TBSSIs report findings of studies which recruited autistic individuals with IQ > 70 (except for Imagining Autism) in community- or clinic-based treatment settings.[7,26–29] While not explicitly stated, most participants were presumed to have language sufficient to allow their participation in the TBSSIs, which suggests at least fluent expressive language. Future research in TBSSIs should seek to adapt to these interventions for children with more limited language abilities.[65] Furthermore, these interventions tended to employ small sample sizes and included mostly adolescent males, who are predominantly white, limiting generalizability of these findings. Consequently, it will be important to expand research on these interventions to include larger, more diverse samples of individuals with a wider range of cognitive abilities, to examine the generalizability of the treatment effectiveness/efficacy. Moreover, when a TBSSI requires specialized training in addition to reviewing the instructional manual, it can be difficult for researchers to conduct studies to empirically validate the approach with high treatment fidelity. Thus, future research can address these limitations and propose methods to bridge the research-to-practice gap.

Most of the studies do not have a more rigorous, empirically sound control group (other than a WLC). This design feature is often critical in establishing a causal relationship between the intervention and the outcome. Future studies should include RCTs with larger and more culturally diverse samples to assess efficacy, along with single-subject experimental designs, to examine intervention when delivered in a variety of community-based and clinical settings. Likewise, future reviews and synthesis of this literature should evaluate the evidentiary quality of the studies reporting on the efficacy or effectiveness of each intervention type. Notwithstanding the need of effective interventions for older autistic individuals—who have unique social challenges like maintaining interpersonal relationships and employment—there is dearth of psychosocial interventions for young adults.[66] Therefore, future studies might focus on TBSSIs adapted to address the unique social challenges of older individuals with ASD.

In another vein, future studies should make use of more sensitive measures of the various constructs of interests (e.g., ToM; social knowledge), including multimodal assessment methods which include self-report measures, direct observation, and multiple informants.[67] It would be especially helpful to assess both proximal, more immediate intervention goals (e.g., based on outlined objectives of the intervention) and more distal outcomes (e.g., social communication and social cognition), as well as evaluate the quality of such evidence. This is needed to establish sound theoretical bases of intervention and provide further support for effects of these approaches. Because language plays a critical role in ToM development and the acquisition of social knowledge,[68,69] the use of assessment methods that will not mask the actual abilities due to language impairment will be especially important. In addition, most studies reviewed here did not assess nor control for confounding variables (e.g., use of psychotropic medications, participation in concomitant therapies). Therefore, future studies should examine how these variables predict treatment outcomes for youth participating in TBSSIs.

Finally, future research should evaluate the unique profiles of autistic individuals who may benefit from TBSSIs so that interventions can be personalized. This could be accomplished using single-subject design, or by examination

of emerging profiles via meta-analyses or larger-scale studies that allow for statistically parsing heterogeneity in outcomes using person-centered approaches (e.g., latent profile analysis). Indeed, Lerner and colleagues[16] outlined the mechanisms of change underlying the amelioration of social functioning in individuals with ASD in psychosocial interventions such as TBSSIs. Future studies may also examine variables that mediate and moderate treatment outcomes. Variables worthy of consideration include, but are not limited to, the quality of the therapeutic alliance between clinicians and participants[70]; the degree of an individual's social motivation, social knowledge, or executive function skills at pre-intervention; and the presence of comorbid diagnoses.[16]

CLINICAL IMPLICATIONS

This review examined the therapeutic potential of TBSSIs for improving social communication and social cognition in youth with ASD. Although some interventions are in the initial stages of research, there is emerging evidence that these interventions may be successfully implemented in educational, clinical, and community settings. In the future, dissemination and increasing accessibility through training and implementation of manualized treatment protocols will be crucial next steps for maximizing the impact of these treatments. These interventions provide individuals with ASD treatment in a less structured and perhaps more comfortable and collaborative environment to practice social interaction and social communication skills without stigma that may accompany more traditional, didactic learning environment. Furthermore, these interventions are usually delivered in a group setting, which can reduce the time-burden often experienced by service providers, and crucially, providing opportunities for participants to receive real-time reinforcement in a supported environment. Additionally, TBSSIs may have supplemental effects on cooccurring psychiatric symptoms in ASD, such as anxiety symptoms,[38,71] thus providing an important avenue toward increasing effectiveness of treatment and reducing burden for both the families and providers.

SUMMARY AND CONCLUSION

The current review examined the bourgeoning research in theater-based SSI approaches for supporting social communication and social cognition in autistic youth. Taken together, there is a promising evidence-base for approaches in improving several aspects of social communication and social cognition, including increased peer interactions and reciprocal friendships, as well as ToM and emotion recognition. However, the effects of intervention seem to vary considerably depending on dosage and/or format of the intervention delivered, and there is limited information whether effects are maintained following the intervention. Additionally, owing to the relatively recent development of some approaches, much of this evidence relies on preliminary studies with less rigorous designs in their initial stages. These interventions should seek to continue to explore effectiveness and efficacy with more methodological rigor and with larger, more diverse samples. Moreover, further examination of active ingredients and mechanisms of change will be a vital step toward maximizing effects of these approaches in supporting social communication and cognition in this population.

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