Randomized Comparative Trial of a Social Cognitive Skills Group for Children With Autism Spectrum Disorder

Latha V. Soorya, PhD, Paige M. Siper, PhD, Todd Beck, MS, Sarah Soffes, BA,
Danielle Halpern, PsyD, Michelle Gorenstein, PsyD, Alexander Kolevzon, MD,
Joseph Buxbaum, PhD, A. Ting Wang, PhD

Objective: This study evaluated the efficacy of a targeted social skills training group in school-aged children with autism spectrum disorder (ASD). The intervention, Seaver-NETT (Nonverbal communication, Emotion recognition, and Theory of mind Training), is a 12-session cognitive-behavioral intervention (CBI) for verbal, school-aged children targeting ASD-specific social behavioral impairments.

Method: Sixty-nine children with ASD, 8 to 11 years of age, with verbal IQs greater than 70, participated in a randomized comparative trial to examine the efficacy of NETT relative to a facilitated play group. Treatment outcomes included caregiver reports of social behavior and neuropsychological assessments of social cognition conducted by blinded raters. Outcomes were collected at baseline, endpoint, and 3 months posttreatment.

Results: Significant improvements were found on social behavior outcomes such as nonverbal communication, empathic responding, and social relations in the NETT condition relative to the active control at endpoint. Verbal IQ moderated the interaction effect on social behavior, with higher verbal IQ associated with improvements in the CBI condition. No significant improvements were found on social cognitive outcomes. No significant group differences were found at 3-month follow-up conducted with approximately half the sample (n = 34).

Conclusion: These data indicate that targeted CBI social skills groups such as NETT improve social communication deficits in verbal, school-aged children with ASD. The moderating effects of high verbal IQ suggest a need to consider participant and treatment characteristics associated with outcomes in future studies.

Clinical trial registration information—Neural and Behavioral Outcomes of Social Skills Groups in Children With Autism Spectrum Disorder; https://clinicaltrials.gov; NCT01190917.

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ocialization groups are a widely used modality for addressing core social impairments in verbal, school-aged and older individuals with autism spectrum disorder (ASD). Socialization groups hold appeal as a cost-effective method to facilitate social contact for individuals at increased risk for social isolation and rejection.[1,2] In addition, empirical support is building for cognitive-behavioral intervention (CBI) approaches, such as social skills training (SST) groups for verbally fluent, school-aged children with ASD.[3] Notable methodological advances are represented in a few recent studies, including the use of randomized controlled trials (RCTs), manualized interventions, standardized outcomes, and fidelity checks.[4] However, several reviews[3-5] point to methodological limitations that question recent practice recommendations, which suggest that SST groups are evidence-based interventions in ASD.[6,7] Specifically, existing research fails to meet core design criteria for evaluating treatment efficacy such as use of adequate sample sizes, active treatment controls, independent outcome evaluations, and data on maintenance and generalization.

The use of waitlist controls in RCTs[8-13] is a particular hurdle for evaluating treatment efficacy of SST groups. Parents report high levels of satisfaction across models including interest-based social clubs, leisure activities groups, supportive play (e.g., board games), as well as CBI-based SST groups.[11,14] In addition to methodological and ethical concerns associated with waitlist controls, the efficacy of therapeutic SST group models must be demonstrated against less costly recreational social group models. From an implementation perspective, the use of active treatment controls will inform the selection of optimal modalities (e.g., skills-based, recreational) and providers (e.g., clinicians, paraprofessionals, peers). From a treatment development perspective, active treatment controls are needed to guide research on mechanisms and common factors associated with outcomes.

To date, 3 randomized comparative trials have been reported in the literature.[15-17] Small samples (n < 14) and limited effects in 2 comparative trials limit interpretation due to underlying assumptions of randomization and statistical models.[16,17] DeRosier *et al.* conducted the largest comparative trial in 55 youths with ASD between the ages of 8 and

12 years.[15] The study evaluated the efficacy of S.S.GRIN, a 15-session CBI curriculum with empirical support for youth with emotional and learning disorders, relative to a modified version for children with "high-functioning autism" (S.S.GRIN-HFA). Significant group differences were found on the Social Responsiveness Scale (SRS) and measures of perceived self-efficacy. However, caregivers in the unmodified S.S.GRIN group reported an exacerbation of ASD symptoms and reduced feelings of self-efficacy, which requires further exploration, given the high parental satisfaction reported in other SST studies.[11,12]

Comparison across SST group studies in ASD is also complicated by variability in outcome measures and treatment targets. Social communication impairments in ASD are developmentally specific and may be associated with cascading effects on other social and mental health domains. Published curricula target social impairments found across social-emotional learning disabilities such as listening skills, friendship skills, and assertiveness training.[9,10] Other studies emphasize ASD-specific impairments in social communication and social cognition,[8,12-14,16-21] whereas still others take a broad-based approach including both general and ASD-specific impairments, such as S.S.GRIN-HFA.[15]

Targeted interventions for core social-communication impairments are of particular interest given the dearth of treatments for core deficits in older children and individuals with ASD. Baghdadli et al. conducted a randomized comparative trial of a 20-session social cognitive intervention targeting nonverbal communication, emotion recognition, stress management, and theory of mind in 14 children with ASD.[17] Although no differences were found in total face recognition scores on the Diagnostic Analysis of Nonverbal Accuracy 2 (DANVA2),[22] the targeted social cognitive intervention was associated with improvements in identification of low-intensity (i.e., difficult-to-identify) adult emotions and quality of life outcomes relative to the active treatment control. However, as previously noted, small sample sizes limit the interpretation of findings from this trial.

This study builds upon prior research by addressing methodological weaknesses limiting interpretation of efficacy of targeted, social cognitive skills training groups. In this study, we evaluated the efficacy of a targeted, 12-session, CBI SST group curriculum: Seaver-NETT (Nonverbal communication, Emotion recognition, and Theory of mind Training). NETT uses targeted and top-down processing approaches characteristic of CBI similar to recently published reports of targeted social cognitive curricula.[12,17,20] The current study uses a randomized comparative design, manualized interventions, fidelity checks, and theoretically based outcomes to evaluate treatment efficacy. The study evaluated dual treatment targets associated with ASD and social learning, specifically, social cognition and social behavior. Treatment moderators were evaluated to help inform a more personalized approach to social skills interventions in ASD. Baseline participant characteristics including verbal abilities, age, and psychiatric comorbidities were evaluated as potential variables associated with treatment response. Moderator analyses may also inform sample selection for future studies seeking to constrain heterogeneity in this treatment area.[23] Given that maintenance data is rarely reported but greatly needed,[4] this study includes a 3-month follow-up evaluation in a subset of participants to estimate durability of treatment effects.

METHOD

Randomization and Study Procedures

This study used a randomized parallel group design comparing NETT and facilitated play (control condition). Participants were recruited in 7 phases between January 2008 and March 2012. Allocation to conditions was determined by computer-generated randomization in blocks of 10 to 12 for each recruitment phase. Assessments were conducted at baseline and endpoint (12 weeks). Funding to collect maintenance data was obtained during the trial and was available for cycles 4 to 7. Outcomes included blinded neuropsychological assessments of social cognition and caregiver reports of social behavior. A subset of children also participated in additional outcome evaluations, including functional magnetic resonance imaging (fMRI) tasks of emotion processing and perspective taking, direct observation during unstructured playtime, and generalization probes with unfamiliar peers. Data from these additional measures will be presented in subsequent reports.

Participants

Potential participants were recruited from community agencies, local practitioners, and advertisements. A total of 87 families provided signed consent between January 2008 and March 2012 to participate in the trial. Inclusion criteria were as follows: 8- to 11-year-old children with a diagnosis of ASD and a verbal IQ score of greater than 70. Diagnosis was established using DSM-IV[24] criteria (clinical interview), Autism Diagnostic Observation Schedule (ADOS, Module 3),[25] and the Autism Diagnostic Interview–Revised (ADI-R).[26] A clinical history, diagnostic testing, and standardized IQ tests were undertaken at screening. Exclusion criteria were as follows: initiation of new psychiatric medication within 30 days before screening, known gross structural abnormalities in the brain, active seizure disorder, and aggression toward others. Of 87 families who signed consent, 18 were not randomized for the following reasons: failure to meet study inclusion criteria, group scheduling conflicts, or inability to complete the first fMRI scan. Informed consent was obtained from all caregivers, and assent was obtained from all child participants. This study was approved by the Mount Sinai Program for the Protection of Human Subjects.

Figure 1 provides a flowchart illustrating participant movement through the trial. A total of 69 participants were randomized, and 66 participants completed the study. From the total sample (N = 69), 38 participants enrolled in cycles 4 to 7 were eligible to participate in the 3-month maintenance evaluation, and 34 participants completed the maintenance evaluation.

Participant characteristics are presented in Table 1. For demographic and outcome variables, t tests were used. There were no significant differences between treatment groups on outcome variables or moderators at baseline. Ethnicity data from caregiver reports highlight enrollment of an ethnically diverse sample: 43% white, 21% black, 26% Hispanic, 1% Asian, and 9% other.

Therapists and Treatment Fidelity

Intervention groups were led by licensed clinical psychologists with a minimum of 3 years of experience working with children with ASD. Each group also included 2 therapy assistants trained in the respective treatment model by lead therapists. Therapists delivered