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Improving Conversational Skills in Children with Autism Spectrum Disorders: A Pilot Study of the Teaching Interaction Procedure (TIP)

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Abstract

Children with Autism Spectrum Disorder (ASD) are often impaired in their ability to generate and maintain conversations with others (American Psychiatric Association, 2000). Poor conversational skills inhibit children with ASD from appropriately interacting with peers and family members, often prohibiting them from developing satisfying relationships with others. The teaching interaction procedure was utilized in the present intervention to improve conversational skills in four children with an ASD. Children ages 7-11 participated in an outpatient social skills group over a period of 10 weeks. Results suggest the teaching interaction procedure was effective in improving conversational skills for all participants. This study highlights issues related to conducting short-term group therapy with individuals with ASD.

Keywords: Children; Conversational skills; Autism; Pervasive developmental disorder

Introduction

Autism Spectrum Disorder (ASD) is a pervasive childhood disorder currently defined by three major domains of impairment: 1) deficits in social interaction, 2) deficits in communication, and 3) restricted or repetitive behaviors (American Psychiatric Association, 2000; DSM-IV-TR). Proposed revisions to the diagnostic criteria in the upcoming Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) by the American Psychiatric Association suggest collapsing the first and second domains of impairment into a broader area of deficits in social interaction and social communication (e.g., conversational difficulties). Specifically, DSM-5 refers to "failure of normal back and forth conversation through reduced sharing of interests…" and "deficits in nonverbal communicative behaviors… through abnormalities in eye contact" [1]. In other words, higher-functioning children with ASD may demonstrate the prerequisite verbal abilities to generate and participate in a conversation, but lack the social-communicative behaviors required to *successfully* initiate and maintain the conversation. Conversational difficulties in children with ASD stem from a variety of deficits, ranging from an inability to demonstrate interest in their conversational partner to the selection of an inappropriate topic for conversation (e.g., a highly idiosyncratic topic their conversational partner is disinterested in discussing).

Several intervention programs exist to improve conversational skills in children with ASD: video modeling [2,3]. Social Stories™, [2] Behavioral Skills Training (BST), [4] and the teaching interaction procedure [5,6]. Although these programs appear effective, it is notable that all of these interventions, with the exception of the teaching interaction procedure, were delivered in a one-to-one setting and, often, included only one participant [2,4]. Although one-to-one settings may be ideal for teaching skills to individuals with ASD, there are some inherent problems with utilizing an individualized format for teaching social skills. For instance, substantial evidence exists to suggest social skills should be taught in a naturalistic environment [7-9]. Furthermore, teaching social skills in the absence of a child's peers often inhibits generalization to peers [10,11]. Thus, lack of peers during training may defeat one of the primary goals of social skills training, which is to assist the child in forming meaningful relationships with others. Practically, delivering social skills interventions within a group setting also maximizes the efficiency of the clinician by allowing the individual to target multiple children with ASD at once.

One procedure that has demonstrated effectiveness in teaching conversational skills within both individualized and group formats is the teaching interaction procedure. Notably, the teaching interaction procedure incorporates the general principles of BST and includes the basic components of BST in its model (i.e., instruction, modeling, rehearsal, and feedback). In one of the first demonstrations of the success of the teaching interaction procedure for an ASD population, [6] implemented the procedure to teach four types of social skills (including social communication skills) to three children with ASD (ages 5-7). One participant was low-functioning (IQ <70) and two were high-functioning (IQ >80). Conversational skills targeted included: appropriately initiating a conversation, not engaging in inappropriate topics, switching topics appropriately, and making on-topic statements. Skills were taught in a one-to-one setting and intervention sessions (30 minutes) occurred daily for 8 weeks. Following the intervention, all three participants demonstrated improvements in conversational skills.

Although Leaf [6] did not use a group setting to teach conversational skills, Dotson, Leaf, Sheldon, and Sherman and Leaf, Dotson, Oppeneheim, Sheldon, and Sherman [5,6,12] delivered the teaching interaction procedure in a group format [12] demonstrated the teaching interaction procedure was effective in teaching conversational skills (i.e., eye contact, maintaining appropriate distance, asking on topic questions, moderating tone of voice/volume) to four adolescents with ASD. The participants met in a group setting twice a week (1.5 hours per day) for approximately 4 months. Although participants mastered

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conversational skills during the intervention, generalization to typical peers was limited.

In the second investigation of the teaching interaction procedure's effectiveness within a group format, [10] implemented a 5-7 month group (3 participants met for the full 7 months, 2 met only for 5 months) to teach general social skills, including conversational skills. Participants were 4-6 years of age and reported to be capable of speaking in full sentences prior to the group. The group met for 1.5 hours, twice a week and conversational skills targeted included: initiating a conversation, giving a compliment, and making an empathetic statement (with appropriate tone of voice). The authors found strong support for their procedure; results of the intervention were maintained at 8 week follow-up and generalization of skills to novel social interactions was identified.

Overall, the teaching interaction procedure appears to be an effective intervention for teaching conversational skills to children on the autism spectrum. A limitation of the present research in this area is the extended length of teaching interaction procedure as reported by Leaf et al. [5,6,12]. The interventions were implemented either daily for 8 weeks, or twice a week for several months. In light of today's managed care environment there is value in exploring the utility of brief group interventions for children with ASD. Moreover, clinicians who deliver evidence-based interventions in naturalistic environments are often faced with time constraints. For example, it is not uncommon for community organized social skills groups to run for only a few weeks at a time. To date, it is unclear whether the teaching interaction procedure can be applied effectively within a brief format. Thus, the present study aimed to conduct a preliminary examination of the effectiveness of the teaching interaction procedure in improving conversational skills within a brief (i.e., 10 week) intervention program.

An additional aim of the project relates to data collection and analysis within a group treatment format. Clinicians and researchers are often faced with the choice between collecting pre-and post-data at the group level or collecting individual data at each session. The standard pre-and post-method provides the clinician and/or researcher with the overall effectiveness of the treatment; however, the program's effectiveness at the individual level may be unclear. Moreover, this approach does not provide the clinician with any information regarding the treatment's efficacy until the treatment has ended; prohibiting the clinician or researcher from making *in vivo* treatment decisions that may positively affect individuals in the group or the group as a whole. In contrast to the pre-post approach, clinicians and researchers may collect data at each session and then evaluate individual progress session by session. This individualized approach provides more information with respect to each group members' progress and allows for more informed decision making on the part of the clinician/researcher with respect to treatment. Our aim in this project was to attempt to balance the gains of utilizing a single-subject approach, while maintaining the naturalistic demands of a community summer social skills program. Within a group program, gains at the individual level must be balanced with the groups' progress as a whole. Thus, our investigation of TIP within a community group sample provides one possible model for balancing these important internal and external validity issues.

Methods

Participants

Participants were four children with autism, ages 7 to 11 years who were enrolled in a community-based summer social skills program for children with developmental disabilities. To be enrolled in the social skills program, participants required a diagnosis of autism spectrum disorder or other developmental disability. As identified by a parent report questionnaire, the children in this study had a primary diagnosis of autism, Asperger's syndrome, or Pervasive Developmental Disorder, Not Otherwise Specified. All children in the group were middle-class Caucasian males enrolled in mainstream classrooms in the local public school system who displayed average to above average verbal skills. See Table 1 for participant characteristics.

Setting and materials

The community-based summer social skills program was conducted at an outpatient training clinic within the Psychology Department at a large, southeastern university. A large room consisting of several chairs was utilized for group meetings. Typically, the chairs were positioned in a large circle. During modeling and rehearsal, two chairs were often positioned in the middle of the room so as to provide maximum visibility to all participants. Two lead clinicians (i.e., authors MS and BRF) and two support clinicians (a graduate student and an undergraduate practicum student) sat amongst the participants during the intervention sessions. During conversational probes, a clinician would sit next to a child and engage in a conversation ranging from one to two minutes (in order to allow for a natural ending point within each conversation, probe time varied). Following the first conversational probe, children were instructed to sit next to a different clinician to engage in a second conversational probe. This procedure was sometimes repeated a third and fourth time with the remaining clinicians, if time allowed.

Group Format

The group met once a week for ten sessions during the summer semester. The first two sessions were used to familiarize participants to the group rules and to conduct baseline probes. During the final session, generalization probes were conducted; thus, the intervention component was implemented during sessions 3-9. Sessions lasted approximately 45 minutes. Included in this time was a review of previous sessions, a description of the session's agenda, teaching interaction procedure, and free time. The community-based program utilized a token economy system to manage behavior and to reinforce participation. Participants received points for appropriate behavior (i.e., sitting in their chair, participating during group). Points could be exchanged for small prizes (e.g., a sticker) or larger prizes that were worth more points (e.g., a set of Pokémon cards). Participants had the opportunity to exchange their points during free time at the end of every group session.

Target Behaviors

Five conversational skills were selected for intervention: Eye Contact, Beginning a Conversation, Ending a Conversation, Asking Questions, and Nodding and Smiling (see Table 2 for an operational definition of each skill). These skills were chosen due to evidence suggesting individuals with ASD often fail to utilize them during conversation and the failure of several participants in our group to

Name	Age	Diagnosis
Travis	7	Asperger's
Sam	11	Autism
Ryan	9	PDD-NOS
Michael	10	Asperger's

Table 1: Participant characteristics.

Target Skill	Operational Definition	Brief Rationale	Sample Cues
Eye Contact	Child displays appropriate eye contact for more than 50% of conversation	• People know you're listening • People feel good when you look at them • People think you're nice and want to keep talking to you	• When someone starts talking to you • When you start talking to someone else • When someone is talking to another person close to you
Beginning Conversation	Child appropriately begins conversation by saying "Hi" (or any equivalent, e.g., "What's up?") or by introducing themselves	• Starting a conversation is the first step for making new friends • If you want to talk to someone, you need to let them know that you are friendly first If you introduce ourselves or say "Hi" before you start talking then people know you are friendly and that you have something you want to tell them. • Saying Hi/Hello first, lets others know you want to get to know them	• When you see someone you want to talk to • When someone looks at you • When you see someone you know from school, church, etc.
Ending Conversation	The child ends the conversation appropriately by saying "Bye" (or some equivalent, e.g. "Talk to you later").	• Once you've started talking to someone, you need to let him or her know nicely that the conversation is over. • If you are nice when you end the conversation, the person will want to talk to you again later. • If you aren't nice and just walk away without saying bye, they might think you are rude and not want to talk to you again next time. • Letting others know you can't talk to them anymore in a nice way (e.g., by saying "I've gotta go! I'll talk to you later") let's the person know you care about them, but that you can't keep talking at that time.	• When it's time for you to leave • When you have nothing left to say • If the other person says "Bye"
Asking Questions	The child asks at least one question related to the topic of conversation	• People feel good when you ask them a question because it shows you care what they are talking about. • Asking questions helps you get to know other people better and helps you make new friends • Asking questions lets the other person get a chance to talk, which makes them feel good.	• If you just finished saying something and the person is waiting for a chance to talk • If you are curious about what the other person is thinking • If you want to start a conversation with someone
Nodding and Smiling	Child will nod at least twice and smile at least once during the conversation	• People like being around you if you nod and smile. • Smiling makes people think you like talking to them and it makes them happy too • Nodding lets people know that you are listening to them and you care about what they are saying.	• When someone starts talking to you • When you start talking to someone else • If someone is talking to another person who is close to you.

Table 2: Operational definition, rationale, and cues for conversational targets.

display these skills at an appropriate level during baseline conversational probes. We utilized the teaching interaction procedure as described by Leaf to teach conversational skills. Consistent with the work conducted by Leaf and his colleagues, we included both a rationale and several cues for each skill within our BST package. The rationale for each skill was provided in an attempt to enhance the participant's understanding of the social importance of each skill, while cues were utilized to provide participants with a set of rules by which they could determine when a particular skill was appropriate. It was also hypothesized that the use of cues would enhance generalization, although this was not systematically assessed in the present study. Prior to the first group session, a treatment manual was developed. The manual defined each skill as it would be explained to participants, and explicated the teaching interaction procedure so as to facilitate implementation for the clinicians. See Table 2 for an operational definition of each skill, the rationale provided to participants, and samples cues taught to participants during the intervention as they appeared in the treatment manual.

Design

A multiple baseline across skills was implemented to evaluate the effectiveness of the teaching interaction procedure in improving conversational skills. The order in which conversational skills were taught was predetermined by the authors and based on both the importance of the skill for conversation and the anticipated difficulty level of each skill for participants (e.g., Eye Contact was considered to be both a more important prerequisite skill for conversation, and also a less complicated skill for participants to master than Asking a Question). Although we used a multiple baseline design, phase changes were determined at the group level, rather than individual performance.

As the intervention was implemented within a time-limited community summer social skills program, we were unable to implement phases at a purely individual level. In keeping with the group format, decisions with respect to phase changes were made at the group level; however, each participant's data were analyzed weekly in an attempt to make a balanced decision with respect to the groups' progress. Thus, clinicians met weekly to review individual progress based on single-subject data collected and to evaluate the groups' overall readiness to move to a new conversational target.

Conversational Probes

During baseline, participants were assigned conversation partners (only clinicians) and instructed to talk about a certain topic. Participants were given topics to discuss (e.g., "Talk about what you did this weekend."). As treatment progressed, participants were assigned to peer conversational partners (i.e., other group members). Peer partners were assigned in order to enhance the social validity of the group and aid in generalization of conversational skills to peers. During treatment probes, participants were also provided with a topic by the clinicians; however, as the group progressed, participants requested to discuss a topic of their choice (e.g., "I want to talk about Super Mario Brothers"). These requests were generally granted in order to maintain the reinforcing nature of the group and enhance interest in conversations. Throughout all phases of the intervention, participants engaged in several conversations with different clinicians and peers. Typically, participants engaged in two conversations with a peer or clinicians, prior to switching conversational partners. Performance during these probes was then averaged to generate the proportion of conversational skills performed correctly.

During the first two sessions, only baseline probes were conducted. No instructions were given to participants (aside from the general instruction to talk about a particular topic). Feedback during baseline probes was not provided. During the intervention component (described below), instruction, modeling, and feedback were only provided for the targeted skill (e.g., for Eye Contact, but not for other conversational targets).

Training procedure

Consistent with the majority of BST programs, the primary components of the current intervention consisted of instruction, modeling, and rehearsal. The current BST procedure is perhaps unique in its adoption of both a rationale and cues, consistent with the teaching interaction procedure as described by Leaf et al. [5] for each conversational skill, a 10-15 minute instruction component was provided. The instructional component was interactive; thus, participants were encouraged to respond to questions and contribute to the development of a rationale for the particular skill. Following the description of the skill and the provision of a rationale and cues, the two lead clinicians modeled the skill for the participants. Several appropriate models were provided, in addition to one inappropriate model (e.g., clinicians maintaining poor Eye Contact during the conversation). Participants were then encouraged to provide the clinicians with feedback (i.e., to identify whether the clinicians performed the skill correctly, and if not, to provide clinicians with feedback on how to improve their performance).

Following the instruction and modeling components, participants were prompted to model the skill appropriately. Typically, a participant was chosen to model the skill with a clinician (often centered in the middle of the room) to encourage peer modeling. Following approximately 1-2 peer models, participants were paired with other clinicians to practice modeling the skill and receive individualized feedback. Correct modeling was reinforced with verbal praise and token economy points. Participants engaged in role-plays until they appropriately demonstrated the skill. Following these role-plays, participants were instructed to engage in conversations with clinicians or peers (i.e., conversational probes). Performance during these

conversations was recorded live by both lead and support clinicians. Participants were also provided with feedback during following each conversational probe.

This procedure was repeated for all conversational skills targeted during the intervention. Previously mastered skills were reviewed at the beginning of each session, and participants were prompted to engage in previously practiced skills during role-plays, in addition to newly taught skills.

Generalization

Generalization of conversational skills was assessed on the final day of group (i.e., session 10). Two novel clinicians were recruited to conduct generalization probes. One participant (Travis) was absent during the final session. The other three participants engaged in three to four different brief conversations with the novel clinicians (all participants engaged in conversations with both novel conversational partners). Participants were not given a conversational topic, but were expected to begin the conversation with the novel clinician and engage in all conversational skills independently without prompting. Feedback was only provided to participants at the end of the generalization session.

Data Collection

Lead or support clinicians collected data during conversational probes. All data collectors were trained on the operational definitions of each skill (these were also reviewed prior to introduction of each skill). During conversational probes, clinicians recorded whether the child did or did not engage in the skill correctly.

Lead and support clinicians coded all conversations live. Interobserver agreement (IOA) was calculated for 31.8% of total conversational probes (57/179 conversational probes). Interobserver reliability was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100. Mean IOA for the present study was 96.6% (*Range* = 50 – 100%; *SD* = 9%).

Results

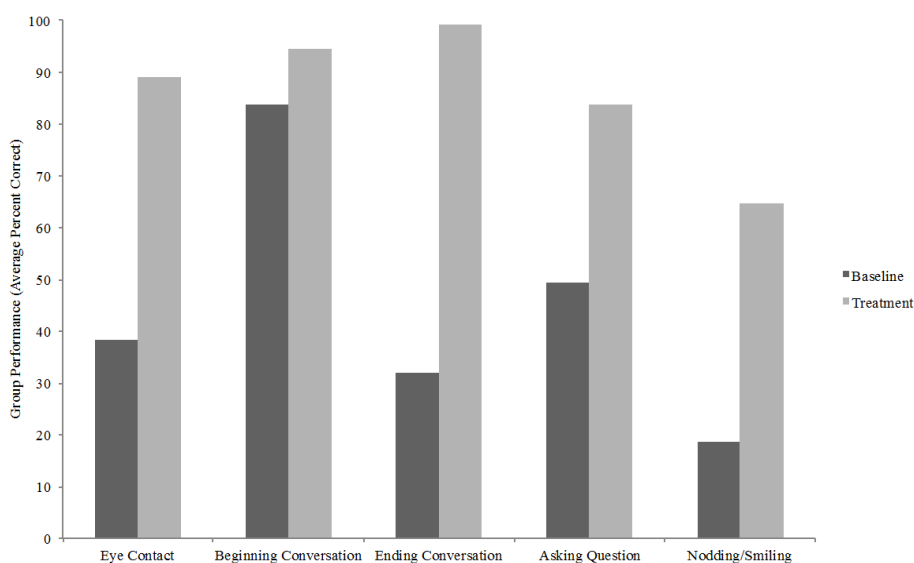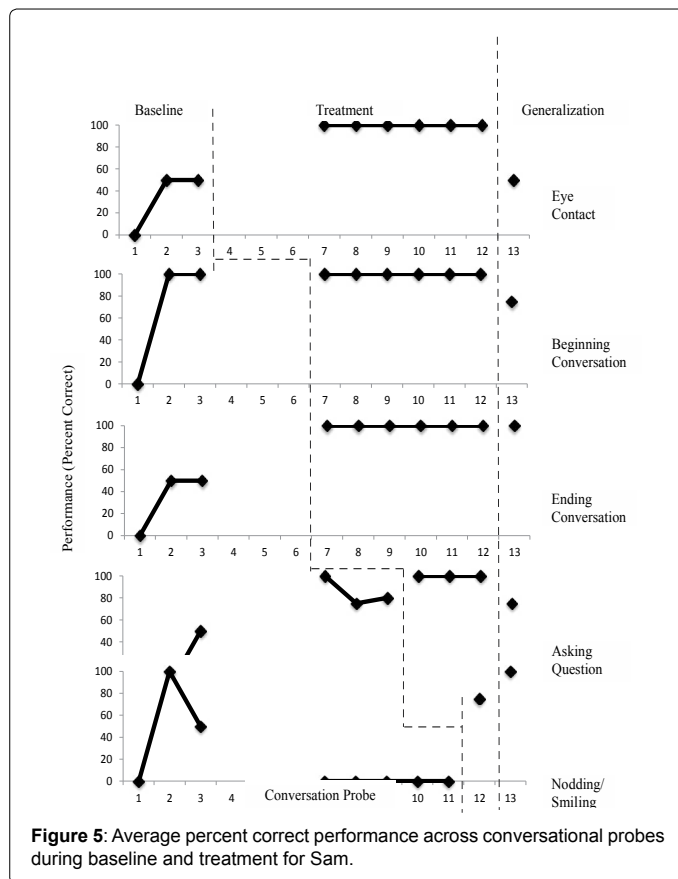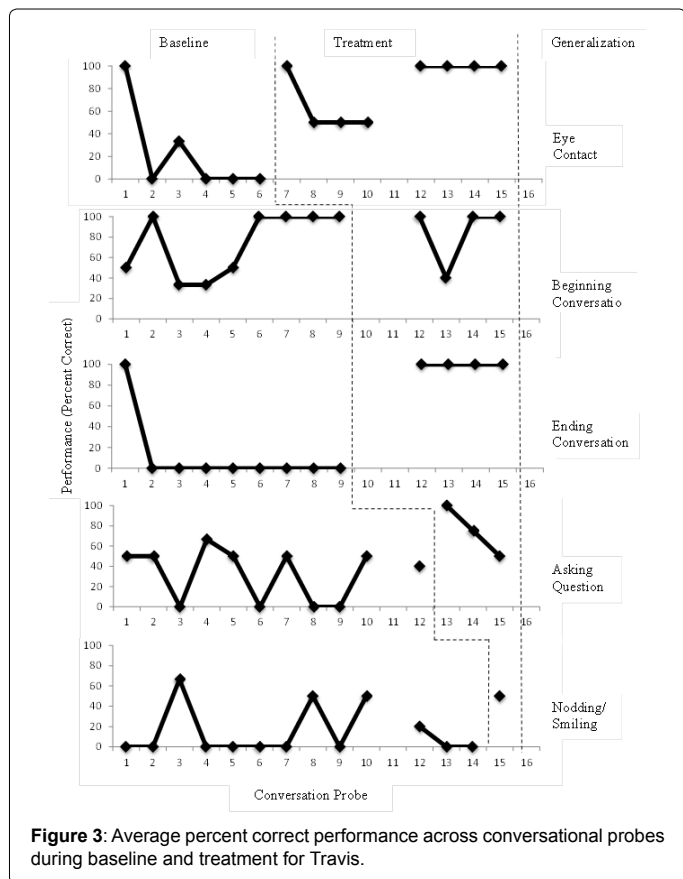Individual data for each participant is provided in the figures below

Figure 1: Average group performance during baseline and treatment for conversational targets.

Figure 2: Average percent correct performance across conversational probes during baseline and treatment for Ryan.

Figure 4: Average percent correct performance across conversational probes during baseline and treatment for Michael.

Figure 3: Average percent correct performance across conversational probes during baseline and treatment for Travis.

Figure 5: Average percent correct performance across conversational probes during baseline and treatment for Sam.

(Figures 1-5). Each panel represents one of the conversational skills taught and the phase-lines denote changes in the probe-type (baseline, treatment, generalization). Aggregated group data (calculated by averaging performance across all participant conversations during baseline and treatment) is presented in Figure 1.

Ryan attended all 10 sessions of group and completed 20 conversational probes in total. During baseline, Ryan's average Eye Contact across the first two sessions was 80.6%. Although he displayed appropriate Eye Contact prior to intervention (100% during the last four baseline probes), his improvement in Eye Contact during baseline was maintained. This similar pattern emerged for Ryan for Beginning a Conversation ($M = 81.5\%$ during baseline). Thus, although Ryan reached mastery criterion for Beginning a Conversation prior to intervention, these gains were maintained during intervention ($M = 100\%$ during treatment). Following intervention for Ending a Conversation, however, Ryan demonstrated a dramatic change. Although his average level of performance for Ending a Conversation during baseline was only 18.5%, Ryan's average percent correct for this skill during treatment was 96%. Similarly, Ryan's ability to ask an appropriate question during the conversational probe became much more stable during treatment ($M = 62.9\%$ during baseline and 72.2% during treatment). Nodding and Smiling during the conversation also dramatically increased following intervention ($M = 11.7\%$ during baseline and 66.7% during treatment). Thus, for each skill, performance increased, stabilized, or maintained at high levels) for Ryan. Additionally, Ryan's treatment gains across all five conversational skills generalized to new conversational partners.

Travis missed 2 group sessions (including the Generalization Session); thus, he attended 8/10 group sessions in total. Travis's Eye Contact significantly improved immediately following the first intervention session (beginning in probe 7). Overall, his Eye Contact improved from 22.2% during baseline to 81.3% during treatment. Travis's ability to appropriately begin a conversation was appropriate prior to intervention (100% during the final four baseline probes), and this performance maintained during treatment. Travis rarely ended conversations appropriately during baseline, however, during treatment his performance improved drastically (100% during all four treatment probes). Although Travis at times appropriately asked his partners questions during conversations in baseline, this tendency did not increase to high levels until intervention. Despite initial treatment gains in this skill, Travis' questioning behavior decreased across the final three treatment sessions. Last, Travis's Nodding/Smiling behavior did not improve during treatment; however, his performance during baseline was already in the appropriate range. Travis did not attend the final generalization session; thus, it is unclear if his improved conversational skills transferred to other conversational partners.

Michael attended 9/10 group sessions. His Eye Contact improved significantly and immediately following treatment (increasing from 0% during baseline to 75% during treatment). As with Travis, Michael appropriately began conversations prior to intervention, and his ability to start conversations appropriately continued during treatment. Ending conversations was much more variable for Michael; however, following treatment, he demonstrated mastery of this skill (100% average performance during treatment and generalization). Similarly, his Asking Questions during the conversations increased following treatment and maintained during generalization (average performance during baseline = 40.9%; during treatment = 87.5%). Michael showed variable performance during baseline for Nodding and Smiling. During treatment, however, he demonstrated an increasing trend for this skill, and ultimately, the skill generalized to new conversational partners during the final session.

Sam participated in a second recreational summer activity during the group and, thus, only attended 7 of 10 group sessions. Due to his absence during the final baseline session, his baseline data are relatively unstable and suggest an increasing trend prior to the implementation of the intervention for several skills. Nevertheless, his data suggest an improvement in conversational skills due to treatment effects. Sam's baseline level of Eye Contact was only 50%; however, this improved to 100% during treatment. As with the other participants, Sam demonstrated the ability to appropriately begin a conversation during baseline (although he displayed difficulty during the first probe). His ability to begin conversations stabilized and maintained during treatment. Sam displayed more difficulty ending conversations appropriately during baseline; however, following the intervention, he mastered this skill. Sam's ability to ask questions during conversations was fairly variable. Upon his return to group (prior intervention for this skill), Sam demonstrated an increase in question asking behavior. During treatment, this increase maintained. Sam's Nodding and Smiling behavior was relatively poor during baseline (average performance = 21.4%); however, his performance during intervention significantly improved (average performance = 75%). During generalization, Sam maintained his performance during treatment across the majority of conversational skills (Beginning Conversation, Ending Conversation, Nodding/Smiling). Interestingly, his eye-contact and question asking behavior decreased slightly during conversations with novel partners.

Discussion

The primary purpose of this study was to conduct a pilot examination of the effectiveness of the teaching interaction procedure in improving the conversational repertoire of children with ASD. We also aimed to conduct a preliminary investigation of the utility of the teaching interaction procedure as a brief outpatient group intervention. Importantly, the intervention was conducted in a naturalistic setting, as treatment was implemented within a community based summer social skills program. Although an individualized data-collection approach was used, treatment decisions were based on both individual and group performance. This decision making model is more suitable for group treatment, more generally, where the pace of the group is determined by the progress of both individual members and the group as a whole. Our approach also served to balance the demands of internal and external validity; as group and time constraints within a naturalistic environment overrode the ability to implement phase changes at a purely individual level.

Overall, the teaching interaction procedure demonstrated preliminary evidence as an effective intervention for improving the conversational skills of four participants with an ASD diagnosis. Throughout the group, Eye Contact, initiating and Ending a Conversation, asking an on-topic question, and Nodding and Smiling increased. As illustrated in Figure 1 the teaching interaction procedure appeared most effective in teaching participants to maintain appropriate eye contact, end a conversation, ask questions, and nod/smile. The change in average performance in beginning a conversation was somewhat less substantial following the intervention, likely due to participants' knowledge of this skill prior to treatment. For the three participants who attended the generalization session, treatment gains appeared to generalize to two novel clinicians. Moreover, the present findings suggest the teaching interaction procedure is effective in improving the conversational skills of a new group of participants: children ages 7-11.

Anecdotally, participants appeared to benefit from both the

instruction portion and the modeling/rehearsal portion of the teaching interaction procedure. The instruction was likely effective due to its interactive (rather than didactic nature). That is, participants were encouraged to actively engage in a discussion of the skill and its importance, rather than passively listen to a brief lecture by the clinician. This interactive component is described by Leaf et al. [5,6] the authors explain the rationale in the teaching interaction procedure is to be developed jointly by the clinicians and the participants. It is hypothesized that high-functioning individuals with ASD, who may fail to appreciate the social relevance of a particular skill, especially appreciate actively participating in the development of a rationale. The modeling portion of the intervention was likely enhanced by the inclusion of both peer and clinician models. Although the relative effectiveness of peer and clinician models was not assessed, participants appeared to respond positively to viewing peer models and participating as models themselves. Last, the addition of an inappropriate exemplar also facilitated group participation. Participants appeared to find inappropriate exemplars comedic, and actively engaged in identifying the social faux pas committed by the clinicians during these models. The novelty of providing clinicians feedback on their social behavior may have contributed to the relative enjoyment observed during this activity. It is also hypothesized that participant participation and interest in group was maintained given the manner in which phase changes were conducted. As noted previously, the decision to move on to the next phase was clinically determined based on both individual and group data; thus, the pace of the treatment was maximally appropriate for all four members of the group.

To our knowledge this is the first demonstration of a brief group intervention employing the teaching interaction procedure to target conversational skills. As highlighted previously the brevity of this intervention is noteworthy, given the current managed care system for psychological services. Several intervention programs for individuals with ASD have demonstrated efficacy within a relatively brief format (8-16 weekly sessions) [13-16]. The current investigation of the teaching interaction procedure suggests it is also an effective intervention option for clinicians who conduct brief social skills groups for individuals with ASD. The group of children targeted in this intervention (i.e., older, higher-functioning children with ASD) might be at a disadvantage in terms of insurance benefits, meaning that some families may be unable to afford treatment and if insurance is also unwilling to cover extensive interventions that span across several months (the time span reported in previous research for the teaching interaction procedure), children with ASD will not receive recently published empirically supported interventions. A second advantage of the present intervention is its manualized format. Prior to the intervention a manual was generated in which all intervention procedures were explicitly described for clinicians. The manualized format facilitates replication of the present results and training of novice clinicians in the procedure. Anecdotally, the use of a manual appeared to yield high procedural fidelity, as reported by other studies using manualized treatments [17-19].

Although the present intervention investigated the effectiveness of the teaching interaction procedure, our results may suggest that traditional BST is also effective in teaching conversational skills to children with ASD. The teaching interaction procedure and BST overlap heavily in their intervention components (instruction, modeling, and rehearsal). In fact, the primary difference between the teaching interaction procedure and BST appears to be the explicit provision of a rationale in the teaching interaction procedure and the focus on "cues;" however, these may be provided in the instruction component of BST. Nevertheless, published studies employing the teaching interaction

procedure clearly describe the inclusion of a rationale and cues [5,6] while current BST literature does not.

Moreover, the inclusion of a rationale may not be appropriate in certain circumstances. Although the participants in the present study appeared to benefit from assisting in the development of a rationale, participants with fewer verbal skills or younger participants may not benefit from this portion of the intervention; thus, in these cases traditional BST may be equally or more effective. Nevertheless, the relative effectiveness of the teaching interaction procedure and BST in teaching social skills and conversational skills in particular, has yet to be determined. A component analysis of these interventions, as well as a direct comparison of the two techniques is needed.

The positive results of the current intervention should be considered in light of some limitations inherent in conducting brief group interventions. First, in an effort to maximize the number of sessions devoted to intervention, short baselines are evident in the data. Additionally, as phase changes were determined at the group level, individual participant data may not be as stable as would be typically seen in interventions conducted at the individual level. Although this limits the strength of the multiple baseline design in demonstrating the effectiveness of the teaching interaction procedure, it does allow for a closer examination of the individual's response to intervention than is typically reported in the group intervention studies (i.e., where only pre-and post-measures are relied upon) (the ubiquity of the pre-post approach is highlighted in many reviews of social skills research, in which the majority of studies identified are defined as "pre-post" [20]. Thus, the present study demonstrates the use of ongoing behavioral observations to balance clinical decision-making and experimental control. An alternative approach that also aims to balance the utility of idiographic data collection within a group treatment format relies on the use of parent report at three or more time points throughout the group [21] for a demonstration of this methodology). Future group-intervention research for individuals with ASD may be strengthened by a combination of these two approaches. Thus, both data obtained from frequent behavioral observations at each session, in addition to self and/or parent report collected at several time points throughout the intervention, may assist in delineating both effective and timely interventions for this population. Moreover, this approach may be an especially useful way to conduct pilot examinations of treatments in community settings, as clinicians and researchers are more likely to be faced with time constraints.

The following minor limitations related to generalization and maintenance of the intervention effects also warrant mentioning. First, it is important to note that novel clinicians, rather than novel peers, served as conversational partners. Additionally, the generalization session was conducted in the same therapy room as the previous intervention sessions in the presence of the group clinicians. Thus, generalization to novel peers in a novel setting is unclear. We also did not assess for generalization of the intervention to other skills. Walberg and Craig-Unkefer [22] demonstrated that improving social communication skills in children with ASD may generalize to joint attention skills and play skills; thus future studies should aim to investigate other treatment gains that may result from TIP for conversational skills. Finally, maintenance of intervention gains was not assessed. The generalization session occurred one week following the final treatment session; thus, it is unknown if gains maintained following the treatment. Subsequent research should aim to continue to assess the utility of the teaching interaction procedure as a brief intervention for conversational skills, while addressing the limitations outlined above.

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