

Social Tools And Rules for Teens (The START Program): Program Description and Preliminary Outcomes of an Experiential Socialization Intervention for Adolescents with Autism Spectrum Disorder

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Abstract Experiential learning is an essential process in the development of core social competencies. Unfortunately, adolescents with autism spectrum disorders often do not possess the prerequisite skillset and motivation to sustain the level of social immersion needed to benefit from this learning process. These persisting social vulnerabilities can limit their long-term relational success and associated quality of life, creating a need for comprehensive social programming. This paper describes a multi-component socialization intervention that simultaneously targets motivational, conceptual, and skill deficits using a hybrid experiential/didactic treatment approach. Evidence of social competence improvements was noted in survey and live conversational measures, indicating that the START program may hold promise as a method for improving the social success of participating adolescents with ASD.

Keywords Adolescents · Autism spectrum disorders · Experiential learning · Social skills training · Social competence

Introduction

Experiential learning is the process of learning through authentic experiences and subsequent reflection on these encounters (Kolb 2014). This active learning immersion may offer unique benefits to participants, as they can make discoveries and experiment with responses and strategies firsthand, instead of just passively benefitting from other individuals' stories, experiences, and lessons. Additionally, individuals are exposed to the full range of dynamic variables and complexities that accompany a real-world experience, most of which is inevitably lost when information must be consolidated and summarized into a format suitable for a didactic instructional lesson.

Experiential learning theory is conceptualized as a four stage learning process (Kolb et al. 2001): (1) A *concrete experience* serves as the stimulus for (2) *reflective observation* on what is functionally working or failing to work in the learning context, which (3) solidifies one's *abstract conceptualization* of a given phenomenon. Based on this accrual of knowledge, the individual is able to engage in (4) *active experimentation* to hone one's knowledge base and associated skill set, which is then applied to future concrete experiences.

When applied to socialization and conversational competence, experiential learning is heavily reliant on sustained immersion in an appropriate social environment (Baker et al. 2002). Mapped onto the four stage experiential learning process, interactions with others provide an experiential stimulus that allow individuals to reflect on

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their interpersonal successes and failures, improve their understanding of successful social strategies, and modify subsequent social bids to improve the likelihood of success in future engagements. For the general adolescent population, the accumulation of these interactions appears to be crucial for establishment of social competence and seems to be predicated upon two interrelated factors: (a) the willingness (or motivation) of the individual to engage with available social partners and (b) the willingness of these partners to be responsive to the social bids of that individual.

As an initial requirement, the individual must have adequate motivation to engage in social interaction. There must be a personally compelling rationale for social participation, whether it is a desire to forge new relationships, obtain acceptance into a social club or group, and/or access some extrinsic incentive or ulterior motive (Ojanen et al. 2010). Additionally, there must be confidence that the quality of the individual's interactions will result in a positive social exchange. Without a clear investment in the social outcome, the individual will not have an adequate incentive to fully engage with their social partners and benefit from the natural lessons inherent within the interaction.

Likewise, peer acceptance is another pre-requisite for experiential social learning. Without a group willing to actively engage the individual, he or she is left without a proper social context to benefit from associated learning opportunities (Ollendick et al. 1992). Herein lies the cyclical nature of the problem: individuals with the most significant social vulnerabilities are frequently ignored or even actively rejected by their peers, preventing them from accessing the very social context needed to enhance their skillset to the minimum threshold to prevent future rejection (Parker and Asher 1987). Thus, such individuals are left without an adequate means to obtain this crucial social traction unless both individual and contextual factors are targeted simultaneously. This dilemma may be particularly relevant for the significant social vulnerabilities inherent among adolescents with autism spectrum disorders (ASD).

Adolescents with ASD often have a skill set that is inadequate for the increasingly complex social situations they face as young adults (Gutstein and Whitney 2002; Hendricks and Wehman 2009). Even *high-functioning* individuals are often at odds with this frequently used descriptive label. As adolescents with ASD transition to adulthood, their social vulnerabilities persist and the majority continue to live with their parents or other caregivers, remain unemployed or underemployed, and rely on the financial support of others (Engström et al. 2003; Howlin 2000). Additionally, this population is at significantly higher risk for developing depression or anxiety (Church et al. 2000; Ghaziuddin et al. 2002; Kim et al. 2000), as greater cognitive awareness also extends to the

recognition of limited social success relative to the general population.

In addition to the aforementioned motivational and contextual socialization barriers facing the general adolescent population, individuals with ASD also experience a myriad of other challenges, including limited social conversation, theory of mind/empathy, abstraction, and agency detection skills (Baron-Cohen 1995; Bauminger 2002; Blair et al. 2002; Starr et al. 2003). While many of these vulnerabilities appear to be linked to the inherent neurobiology of the disorder (DiCicco-Bloom et al. 2006), there is also growing acceptance of the hypothesis that the initial symptoms of autism contribute to more pronounced vulnerabilities later in life due to the transactional nature of development (e.g. Jones and Klin 2009). The ultimate social outcomes of individuals with ASD appear to be a confluence of their initial symptom profiles, the availability and sustainability of suitable social experiences, and the quality of available intervention efforts.

Structured social skills intervention models have been growing in popularity as a means to address the core area of socialization difficulties of adolescents with ASD. There is a growing body of evidence supporting the effectiveness of these group socialization efforts (Miller et al. 2014; National Autism Center 2009; Reichow et al. 2012). However, there is currently very limited research available on the potential benefits of experiential social learning within a social skills intervention context.

Many existing social skills intervention programs focus primarily on didactic lessons. These approaches rely on systematic instructional methods to address many of the social vulnerabilities associated with ASD (e.g. conversation skills, humor, perspective-taking, empathy, etc.) with a controlled follow-up opportunity to practice the skill of interest (e.g., Laugeson et al. 2012; Ozonoff and Miller 1995; Webb et al. 2004; White et al. 2010). Opportunities for experiential learning remain relatively limited and are commonly relegated to social homework assignments in school or community settings (outside of the structured intervention context). While this instructional format has yielded very promising evidence of therapeutic effect, it does not currently offer embedded experiential components that might address other key barriers, such as limited motivation or peer acceptance challenges, which may prevent or limit access to practice opportunities within natural social contexts. In other words, adolescents may not be able to practice a newly learned social skill with a peer group that actively rejects or ignores them.

There may be unexplored benefits of a social instruction model that places equal emphasis on opportunities for dynamic, natural interactions within a peer group (experiential learning) along with more commonly used didactic learning approaches. This “learn by doing” augmentation

may be crucial to the development of social competency, as it may expose participants to sufficient opportunities to both (a) feel included and accepted by a group of peers and (b) use this forum to become fully immersed in a dynamic, reflective learning process (i.e., experience both success and failure within a forgiving social environment, process these experiences, further develop one's abstract conceptualization of social understanding, and return to this context to experiment with more effective strategies). This therapeutic arrangement provides a seamless generalization opportunity while also creating unique opportunities to embed learning strategies that promote self-awareness and reflection into a social learning program. This may be especially important given the concerns about sustainability and generalizability in autism intervention efforts, which may be linked to the limited metacognitive capacities of individuals with ASD (Grainger et al. 2014; Williams et al. 2009). Specifically, these individuals may struggle with generalized application of social principles due to limited self-awareness and reflection skills.

As a promising method for increasing self-awareness and reflection, self-management is a relatively discrete intervention technology that can be easily embedded within an experiential context. These methods have received considerable research attention for transferring monitoring responsibilities to the actual person engaging a desired target skill (see Lee et al. 2007 for a review and meta-analysis). Within this context, individuals are taught to track their own behavior in an effort to promote awareness and internalized skill acquisition. These methods have been used in previous investigations to specifically target social skills (e.g., Doggett et al. 2013; Koegel et al. 1992; Newman and Ten Eyck 2005) along with self-regulation and mindfulness (Carr et al. 2014). Self-management fosters a sense of intentionality in one's actions and allows for guided experimentation with a new set of social interaction strategies. In addition to promoting opportunities to engage in reflective practice, another advantage of self-management is that adolescents participating in a group intervention can self-manage different social skills—each reflective of a slightly different vulnerability profile. In other words, it is possible to individualize an aspect of the intervention package even within the context of a group-based program. This promising monitoring strategy is explored as an experiential technique within the context of the current investigation.

The goal of the current study was to evaluate a hybrid socialization intervention approach that combines experiential and didactic components into a single multi-component treatment model. Specifically, a program description and preliminary outcomes will be provided for the Social Tools And Rules for Teens (START) program, a comprehensive social skills intervention for adolescents with ASD.

Method

This project received Institutional Review Board (IRB) approval and was conducted at a North American university.

Participants

A total of six adolescents participated in the initial investigation of the START program. Participants were adolescents aged 12–17 with an existing diagnosis of ASD meeting current DSM-5 criteria. Inclusion criteria also included (a) use of full sentence phrases to communicate (fluent language use), (b) a verbal IQ equal to or greater than 70, and (c) an ASD diagnosis confirmed by meeting cut-offs designated by the Autism Diagnostic Observation Schedule, Second Edition (Lord et al. 2012), Autism Diagnostic Interview, Revised (Rutter et al. 2003), and the Social Responsiveness Scale, Second Edition (Constantino and Gruber 2005).

Participants were recruited from several sources, including communications with local high schools, referrals from community organizations, word of mouth, and responses from online research announcements. All potential participants were scheduled for intake appointments to ensure that they met all inclusion criteria and complete pre-intervention measures. A summary of participant demographic information is provided in Table 1.

Design

For this preliminary investigation, a combination of a clinical case series and a multiple baseline design across participants and behaviors was employed to understand the social improvement trajectories of participants as they progressed through the START program. Initially, the participants completed all dependent measures during two pre-intervention sessions spaced 5 weeks apart to assess for the stability of social measures in the absence of any social intervention efforts. Following the onset of intervention, they were reassessed with all measures after completion of 5, 10, 15, and 20 (final) session time points during separate progress meetings.

Procedure

Social Facilitator Training

High-achieving college students were recruited from university undergraduate psychology courses to serve as social facilitators for the START program. These volunteers received an initial 10-h training on basic group facilitation

Table 1 Participant demographic information

Participant	Age, ethnicity, sex	Clinical diagnoses	Verbal IQ/Index	Nonverbal IQ/Index	FSIQ	School setting	Grade	Current services
1	14yo Caucasian Female	ASD	108	89	99	Home School/Online Educational Program	8	None
2	15yo Caucasian Male	ASD	97	96	96	Regular Education Public High School	10	Peer groups, Psychiatric Consults
3	16yo Biracial Male	ASD, OCD, Depression	79	88	81	Regular Education Public High School	11	Peer Mentor, Monthly Psychiatry Consults
4	13yo Caucasian Female	ASD	117	129	127	Regular Education Public Junior High School	7	Counseling, Respite
5	15yo Caucasian Female	ASD	85	115	98	Home School/Online Educational Program	10	Educational Therapy
6	14yo Latino Male	ASD, ADHD	88	85	86	Regular Education Public High School	9	Counseling, Monthly Psychiatry Consults

techniques, covering basic group facilitation skills, methods for fostering rapport, and exposure to practice group sessions. The social facilitators also participated in weekly 1-h supervision meetings for ongoing clinical training purposes. An advanced clinical psychology doctoral student and a licensed clinical psychologist jointly conducted all training and supervision sessions.

Pre-Intervention Sessions

All participants completed an initial 90-min intake session, which consisted of obtaining consent/assent from parents and adolescents, obtaining basic demographic information, and completing all required measures. After a five-week waiting period, participants returned to re-complete these measures in a second pre-intervention session. Trained research assistants conducted all intakes and subsequent progress meetings.

Target Skill Selection and Self-Management

During the initial pre-intervention session, an assessment of individual social vulnerabilities was conducted. Participants were provided with a list of 12 common social skill difficulties/vulnerabilities with the option to write in additional concerns that were not listed. This list was generated internally by the research team and included commonly observed social skill deficits among the clinical population: *asking relevant (on-topic) questions, making relevant comments, increasing conversational bids, limiting conversational contributions (over-sharing), greeting others, ending conversations appropriately, using voice qualities (volume, rate, intonation), making eye contact, directing appropriate facial expressions, expressing empathy, choosing appropriate (positive) topics of conversation, using humor, and complimenting others*. Based on a rank order of specific social skill difficulties completed separately by each adolescent, their parent, and an intake clinician, consensus was reached on an individual social skill to serve as the initial focus of self-management. The primary objective was to directly target the social skill deficit that was identified as having the largest negative impact on each adolescent's level of social success. In this preliminary investigation, a total of four different skill targets were targeted among the six participants.

During the second pre-intervention meeting, the assigned facilitator reintroduced the selected social skill to the adolescent and they jointly discussed the value of that particular skill in the process of forming and maintaining relationships. The skill was operationally defined for the participant, modeled by the social facilitator, and then practiced in a brief conversational exchange. After the participant verbally expressed a strong understanding of

the target social skill and successfully demonstrated accurate self-management in conversation (i.e. using a small digital tally counter to record using the skill appropriately), they were subsequently encouraged to self-manage their use of this skill during each START group session. Individual goals were reevaluated every 5 weeks and new skills were introduced as participants either (a) demonstrated adequate mastery of a previous target skill or (b) exhibited a more significant challenge in another skill domain that was identified as a greater source of social difficulty.

START Program Sessions

All of the adolescents began participation in the START program immediately following completion of their second set of pre-intervention measures. The 2-h weekly program consisted of the following components: an individual therapeutic check-in session, a group unstructured socialization time, a structured group activity, a group discussion and practice of a social skill topic, and an individual checkout session with parent involvement. All participants and 3-5 social facilitators took part in each group. The structure of each session is depicted in Fig. 1.

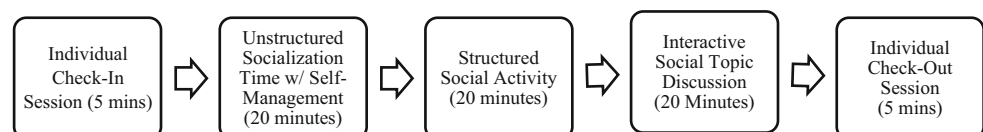
Check-In Session. The 5-min individual check-in session was run by an individually assigned social facilitator and took place in a small clinic room. Within an experiential learning model, these sessions provided an opportunity for the participants to reflect on their social experiences and social homework objectives of the previous week. To concretize this process, the participants first rated their perceived level of success in using their individual target skill and their general level of social comfort over the past week using a 5-point Likert scale. These ratings were then used to facilitate private discussion and reflection between participants and their facilitators on their perceived social difficulties and successes. As a method to encourage participants to engage in abstract conceptualization of the previous week's social topic, participants were encouraged to focus on a particularly salient social event and connect their use of specific skills to the ultimate outcome of the interaction. The check-in sessions were also used to prime the participant with a brief description of the session activities and practice self-management in a brief conversation with the clinician. Finally, participants were reminded to (a) monitor social group reactions to their use of their target skill to solidify their understanding of why

certain strategies make them a more desirable social partner and (b) engage in active experimentation during the group (e.g. make different types of social inquiries or tell someone a different personal anecdote). After completing the individual check-in sessions, all participants were brought together to start the group phases.

Unstructured Socialization Phase. The first 20 min of the group consisted of unstructured socialization time. When mapped onto the experiential learning model, this time period served as the concrete social experience to facilitate reflective observation. This unstructured time was allowed to unfold without a predetermined agenda and was intended to create a natural, comfortable social context in which to engage in both reflective observation and active experimentation. Topics were introduced by the participants and often included video games, favorite foods and places to eat, school and current events, vacation and weekend plans, and memorable personal experiences. Food and refreshments were provided during each group to aid in the creation of a casual, club-like atmosphere. While conversing with one another, the participants and social facilitators simultaneously tracked their use of individual target skills. Social facilitators also participated in this process to ensure that every group member adhered to identical program expectations and stigma was minimized. It was explained that everyone can improve the intentionality of their social actions, and the social facilitators modeled this assertion by tracking their own use of a personally identified skill of interest (e.g. questions, compliments, positive statements, expressions of empathy, etc.).

Group Activity Phase. After approximately 20 min, the group transitioned into a structured social activity. These activities varied each week, but generally resembled commonly used team-building activities and party games. This phase was intended to foster sharing of personal information, encourage learning about peer interests, increase comfort in the group context, and promote cooperation and teamwork in a highly structured context. Examples of activities included *Social Bingo*, *Apples to Apples*, *Bowl of Nouns*, and *Headbands*. Activities served as additional experiences for reflective observation and social experimentation. They were selected to be highly enjoyable and intrinsically motivating to increase the engagement of the group participants. Collateral benefits included opportunities to work on effective communication, compromise, teamwork, and sportsmanship skills.

Fig. 1 START program session timeline



Topic Discussion and Practice Phase. After the structured activity phase, individuals were asked to share their reflections on the previous week's topic that were originally discussed during the check-in session. Common themes and challenges were identified and discussed as a group to promote deeper understanding of each social concept. The social facilitators then introduced the week's social skill topic, which was discussed for the remaining time of the group session. After a brief introduction of the target skill, the topic was then modeled by the social facilitators in a series of two brief contrasting role-plays—one "bad" example demonstrating poor implementation of the skill and a follow-up "good" example depicting proper use of that particular skill. Social facilitators then discussed pre-determined topic summary items and illustrated them by describing relevant personal experiences. The adolescent participants were then encouraged to contribute to the topic—discussing their experiences related to that topic and providing relevant suggestions regarding the successful use of a particular social skill. Finally, for the last 5 min of the group, all participants practiced the related skill with a partner. A manualized curriculum of key points and sample stories/scripts were used to structure and guide these discussions. This portion of the group was intended to promote joint understanding of a social skills topic and provide opportunities to both observe and practice the skill. Social skills topics covered included: making introductions, maintaining a conversation, respectfully disagreeing,

and group interactions. A complete list of the topic curriculum is depicted in Table 2.

Check-Out Session. Finally, a 5-min individual check-out session was conducted with each participant, one parent, and a social facilitator. Participants rated their level of comfort (a) using their identified target skill and (b) interacting with the group using separate 1-5 Likert scales. They were then asked to use these ratings as a means to reflect back on their experience and form hypotheses about why they felt that the group went positively or negatively. This process was intended to help the participants review their interactions in an intentional, systematic way to ensure that they could fully benefit from the experiential learning process. Each participant was then given personalized feedback about aspects of their group participation that the facilitator felt was exemplary, along with areas that may have warranted improvement. This process was intended to model the abstract conceptualization process by connecting specific participant behaviors to reactions from their peer group. This discussion was intended to establish general guiding concepts for future socialization experiences. For example, the facilitator might point out how a participant's harsh criticism caused a peer to become visibly upset in the group, or how a fellow peer smiled when the participant used a compliment appropriately. The participants were then encouraged to discuss the group social skills topic with their parents to foster mutual understanding and continued use of the skill in their home

Table 2 START weekly group discussion topics

Week	Topic
1	Greeting others/making initial introductions
2	Using questions in conversation
3	Using comments in conversation
4	Showing interest—attention, eye contact, facial expressions
5	Choosing appropriate topics for conversations
6	Making and keeping friends
7	Changing topics/ending conversations/saying goodbye
8	Reducing anxiety/being comfortable during social exchanges
9	Expressing empathy
10	Complimenting others
11	Making a good impression/giving social feedback
12	Receiving social feedback
13	Respectfully disagreeing with others
14	Demonstrating good sportsmanship/being a good winner and loser
15	Working in a group/being a good team member/leader
16	Using appropriate humor and understanding/using sarcasm
17	Having social courage/joining a new group of peers
18	Using social media
19	Hosting others at your home/being a good guest at someone's home
20	Summary of group topics and conclusion

environment. As a final step, the social facilitator, participant, and parent(s) jointly established two social skills homework goals to work on during the following week—one based on the individual's self-management goal and one based on the weekly topic discussed in group. Take-home sheets were provided to allow participants and parents to track their completion of the homework objectives each week. This process ensured that participants continued to seek out additional experiential learning opportunities in their natural social settings so that they could process them during the next session.

Fidelity of Implementation

While sessions were not videotaped, a fidelity checklist was completed during each group session to monitor adherence to the established intervention protocol. Session fidelity fell consistently above 95 %. As an additional treatment integrity safeguard, project investigators also sat in on random group sessions to observe.

Data Collection

In addition to the two pre-intervention sessions, social skills data were also collected during progress meeting sessions held every 5 weeks between regularly scheduled group meetings (i.e. between the 5th and 6th sessions, 10th and 11th sessions, 15th and 16th session, and after the final 20th session). Participants and parents completed all survey and conversational probe measures described below.

Dependent Measures

Parent and Adolescent Social Survey Measures

A variety of self- and parent-reported survey instruments were administered to assess changes to social competence:

Social Skills Improvement System Rating Scales (SSIS-RS). The SSIS-RS is a 75-83 item revised version of a widely-used rating scale measuring several aspects of social skills, including Communication, Cooperation, Assertion, Responsibility, Empathy, Engagement, and Self-Control (Gresham and Elliott 2008). Internal consistency alpha reliability coefficients for the parent and self-report forms are reported to be in the mid to upper .90 s, with moderate to high correlations to corresponding social and behavioral scales on the Behavior Assessment System for Children, Second Edition and the Vineland Adaptive Behavior Scales, Second Edition. Both parent and adolescent-report surveys were completed during each progress meeting.

Social Responsiveness Scale, Second Edition (SRS-2). The SRS-2 a 65 item rating scale that covers various

dimensions of interpersonal behavior, communication, and stereotypic behavior associated with ASD (Constantino and Gruber 2005). Score reductions are associated with a decrease in the severity of ASD symptoms. Internal consistency alpha reliability coefficients for the parent forms were reported to be above 0.90 and strong correlations were reported ($r = 0.52-0.74$) with subscales of the ADI-R.

Social Motivation & Competencies Scale (SMCS). The SMCS is unpublished rating scale that was developed by the current researchers for use in this study. Separate parent and adolescent self-report versions were developed that contained identical item content. Items pertaining to comfort in social interaction, conversation skill use, empathy, friendships, appropriate behavior, social contact, and social interest are rated on 1-5 Likert scales. See “Appendix 1” to review the SMCS survey items.

Dynamic Conversation Probe Data

This investigation also employed the use of live conversations to assess dynamic social skill changes on a variety of individualized social target skills. During the two pre-intervention and four intervention progress meetings, participants engaged in two separate 5-min (600 s) “get to know you” conversations with both an unfamiliar male peer and an unfamiliar female peer. These peers were unaffiliated with the research project and were naïve to the project aims or participant's social disability status. Dynamic social data were obtained through the systematic coding of these video-recorded conversations, and data from both conversations recorded on the same day were combined to create a mean score for that progress meeting. Trained research assistants that were naïve to the hypotheses of the study and treatment aims coded all conversation videos in random order. Individualized target skill measures fell into four categories:

Increasing Social Inquiries. Question asking has been described in the literature as a crucial social skill (Doggett et al. 2013; Palmen et al. 2008; Weiss and Harris 2001). A frequency count of social inquiries made in the video clips was conducted for both the participant and the conversational partner. A social inquiry was defined as verbal question that was clearly intended to elicit a verbal response from a conversational partner. Both number of social inquiries and the percentage of the total inquiries made were calculated. The ultimate objective of this target skill was to increase participant social inquiries so that a roughly equal number of questions (50 %) was exchanged between them and their conversational partners, which would be an indication of a balanced, reciprocal conversational exchange. Inter-rater reliability for social inquiries was calculated for approximately 33 % of videos and resulted in a mean of 88 % agreement (range of 82–96 %).

Decreasing Negative Statements. Individuals with ASD often have limited understanding of socially appropriate topics of conversation and offer overly honest opinions about subject matter without filtering their messages (Landa 2000). Several individuals in this study struggled to engage in primarily positive topics of conversation. Therefore, goals were set to increase the number of positive and neutral statements while simultaneously decreasing the occurrence of negative statements. A negative statement was defined as a critical judgment or unfavorable comment about oneself or another person, topic, or event. Twenty-second intervals were coded by raters as focusing primarily on (a) negative or (b) positive/neutral subjective content. A percentage was then calculated to determine the ratio of intervals in the conversation that were dominated by negative comments. Inter-rater reliability for negative statements yielded a mean of 90 % agreement (range of 81–100 %).

Increasing Verbal Contributions. The successful use of social conversational bids is associated with higher levels of peer acceptance (Burlison et al. 1986), while interpersonally reserved individuals generally possess a lower level of sociometric status (Newcomb et al. 1993). Participant 5 was noted to speak very infrequently during pre-intervention conversations and was encouraged to increase the frequency of verbal contributions. During five-second intervals, raters coded whether or not the participant made a verbal contribution of more than two words. This cut-off ensured that a participant who habitually provided only minimal verbal responses to questions (e.g. responding “yes” or “not really”) was not coded as providing appropriate verbal contributions to a conversation. A percentage was then calculated to determine the total percentage of time participants were speaking during each 5-min clip.

Decreasing Verbal Contributions. Alternatively, an excessive, pedantic speaking style is also observed in select subgroups of individuals with ASD (Ghaziuddin and Gerstein 1996), particularly during discussions of highly preferred thematic content (Elder et al. 2006; Nadig et al. 2010). Participant 4 was encouraged to work on limiting her excessive level of verbal information in order to allow her conversational partners more opportunities to participate in discussions. An identical verbal contribution coding definition (described above) was implemented using five-second intervals. Inter-rater reliability for both verbal contribution categories yielded a mean of 92 % agreement (range of 82–100 %).

Social Validity Ratings

Parents and participants were both asked to provide ratings to provide information about the acceptability of the START program. Specifically, they were asked to provide

separate ratings on a 0-10 Likert scale on both (a) enjoyment of the adolescent’s time in the group and (b) the extent to which the adolescent’s social skills/competence improved as a result of participation. The specific questions provided to participant and parent were as follows:

On a scale from 0 to 10, how much did you enjoy (for parents: do you think your child enjoyed) being a part of the social club?

On a scale from 0 to 10, how much did your (for parent: your child’s) social skills/competence improve through participation in the club?

Results

Parent and Adolescent Social Survey Measures

Survey data and associated effect sizes for all participants are summarized in Table 2.

SSIS-RS

Parent-reported SSIS-RS Social Skills standard scores were noted to yield consistently positive score increases (mean of 5.3, range of 2.25–8.25) when comparing the mean of the final two intervention progress meetings to the mean of the two pre-intervention scores over the course of the project, with four exceeding the SSIS-RS’s Standard Error of Measurement (SEM = 3).

For the adolescent self-report SSIS-RS Social Skills, a mean comparison from the final two progress meeting scores to both pre-intervention scores indicated that four participants (1, 2, 4, 5) endorsed general gains to their Social Skills standard score (exceeding the measure’s SEM) while two (2, 6) endorsed a decrease in total score.

SRS-2

When comparing pre-intervention and intervention means for the SRS-2, five participants (1, 2, 3, 5, 6) experienced a reduction in their total score that exceeded the SRS-2’s SEM of 2.2, which is indicative of the desired *decrease* in their endorsement of autism-related symptoms. The mean change in SRS-2 score was -4.3 (range of -11 to 3). One participant (6) experienced a negligible change, and one (2) experienced an increase in score.

SMCS

For the parent-reported SMCS scores, a comparison of the mean of participant pre-intervention scores to the final

intervention progress meeting scores were indicative of social increases (mean of 9.1 point increase with a range of 3.0–34.0 points).

A comparison of the pre-intervention mean to the progress meeting scores demonstrated Four participants (1, 3, 4, 5) endorsed gains in their adolescent self-report SMCS total scores, while two (2, 6) experienced a decrease in their mean score. The mean change in score across all participants was 10.7 (range of –10.5 to 28).

Dynamic Conversation Probe Data

Dynamic conversation probe data is summarized below and is generally reflective of improvements to

individualized target social skills (with medium to large effect sizes). Results are described for each individual participant below (Table 3).

Participant 1: Increase Social Inquiries and Decrease Negative Statements

Participant 1 exhibited consistently low levels of question asking prior to beginning the intervention, asking a mean of 5 questions (range of 4–9) during the 10-min pre-intervention probes, representing a mean of 17.8 % (range of 11.6–24.0 %) of the total questions asked during her conversations. This skill was actively targeted in the first 5 weeks of the START program, and Participant 1

Table 3 Parent and adolescent-report social survey scores

Survey measure	Adol	Pre 1	Pre 2	Pre-intervention mean (SD)	Week 5 Progress	Week 10 Progress	Week 15 Progress	Week 20 Progress	Intervention mean (SD)	Δ Mean score	Effect size
SSIS-RS—parent rating social skills standard score	1	47	58	52.5 (7.78)	54	65	62	62	62 (0.00)	9.5	2.44
	2	83	78	80.5 (3.54)	80	84	93	85	89 (5.66)	8.5	1.94
	3	89	92	90.5 (2.12)	95	101	83	105	94 (15.56)	3.5	0.32
	4	84	84	84 (0.00)	84	95	92	80	86 (8.49)	2	0.33
	5	81	67	74 (9.90)	74	78	77	84	80.5 (4.95)	6.5	1.07
	6	76	76	76 (0.00)	81	76	81	75	78 (4.24)	2	0.67
SSIS-RS—adolescent rating social skills standard score	1	86	84	85 (1.41)	103	106	102	103	102.5 (0.71)	17.5	20.21
	2	77	91	84 (9.90)	79	82	89	86	87.5 (2.12)	3.5	0.68
	3	100	100	100 (0.00)	98	95	92	85	88.5 (4.95)	–11.5	–3.29
	4	115	115	115 (0.00)	127	127	128	128	128 (0.00)	13.5	27.00
	5	94	109	101.5 (10.61)	119	121	123	124	123.5 (0.71)	22	4.13
	6	78	68	73 (7.07)	89	72	67	65	66 (1.41)	–7	–1.91
SRS—parent total standard score (Lower scores indicate improvement)	1	90	90	90 (0.00)	90	90	77	88	82.5 (7.78)	–7.5	–1.36
	2	74	73	73.5 (0.71)	70	69	67	70	68.5 (2.12)	–5	–3.24
	3	71	78	74.5 (4.95)	69	61	85	57	71 (19.80)	–3.5	–0.25
	4	65	65	65 (0.00)	64	68	68	68	68 (0.00)	3	–*
	5	79	81	80 (1.41)	70	72	72	66	69 (4.24)	–11	–3.57
	6	71	70	70.5 (0.71)	70	74	68	69	68.5 (0.71)	–2	–3.27
SMCS—parent rating total raw score	1	48	51	49.5 (2.12)	65	77	83	109	96 (18.38)	12.5	11.79
	2	69	77	73 (5.66)	73	78	79	76	77.5 (2.12)	16	3.27
	3	92	87	89.5 (3.54)	94	99	70	107	88.5 (26.16)	4.5	0.40
	4	81	81	81 (0.00)	85	90	96	92	94 (2.83)	5	0.83
	5	67	65	66 (1.41)	76	80	81	90	85.5 (6.36)	14.5	4.06
	6	79	73	76 (4.24)	85	78	84	74	79 (7.07)	2	0.54
SMCS—adolescent rating total raw score	1	97	95	96 (1.41)	116	118	115	119	117 (2.83)	21	13.14
	2	84	81	82.5 (2.12)	63	68	81	81	81 (0.00)	–1.5	–1.23
	3	102	102	102 (0.00)	101	100	151	104	127.5 (33.23)	25.5	0.59
	4	120	120	120 (0.00)	128	128	128	127	127.5 (0.71)	7.5	18.98
	5	83	89	86 (4.24)	105	118	109	119	114 (7.07)	28	4.57
	6	107	105	106 (1.41)	99	105	82	109	95.5 (19.09)	–10.5	–0.74

* Could not be calculated due to baseline and intervention SD of 0.00

increased her number of social inquiries to 10 and asked 48.7 % of the total questions in her conversation probes. After her target skill changed and social inquiries were no longer her active target (reflected in progress meetings 2–4), she continued to ask a mean of 39.1 % of the total questions asked (range of 20.0–46.9 %), consisting of a mean of 12 questions per conversation (range of 8–15), although a decreasing trend was noted. The effect size for increases in her social inquiries overall was large ($d = 1.88$).

Once she demonstrated initial proficiency with use of social inquiries at progress meeting 1, Participant 1's goal was changed to address the amount of negative statements she made. She was asked to decrease her negative statements by focusing on increasing her use of positive and neutral statements. During the baseline phase for this new target behavior (which included both pre-intervention sessions and the first progress meeting), Participant 1 was found to discuss negative topics a mean of 30.4 % of conversational intervals (range of 24.0–40.5 %). Her negative statements initially remained high at 35.0 % the first five weeks of actively targeting this behavior and subsequently decreased at 10 and 15 weeks of intervention to a mean of 17.3 % (range of 8.5–11.0 %). The effect size for negative statements was also large, $d = -1.07$ (with the negative value indicative of the desired reduction in negative statements). Participant 1's data is depicted in Fig. 2.

Participant 2: Increase Social Inquiries and Decrease Negative Statements

Participant 2 also exhibited low initial levels of social inquiries (mean of 2.3, range of 1–4), constituting a mean of 7.7 % (range of 4.6–10.7 %) of total questions asked per conversation. After targeting this skill for the first five sessions prior to progress meeting 1, his percentage of questions asked increased to 18.5 % (5 total questions per conversation). At this timepoint, Participant 2's level of negativity was determined to be having a greater impact on his social success than his number of social inquiries. After this change to focus on negative statements, Participant 2's number and percentage of social inquiries continued to improve during the post-target phase (progress meetings 2–4), increasing to a mean of 26.4 % (range of 15.7–44.4 %) with a mean of 5.5 total questions (range of 3–10). There was a notable increasing trend in the data, even though making social inquiries was no longer the active target skill. The effect size for Participant 2's improvement in making social inquiries was large, $d = 1.51$.

Despite notable reliance on negative conversational strategies during group, Participant 2 only engaged in negative statements for a mean of 4.8 % (range of 3.0–6.0 %) of conversational intervals while conversing with novel social partners (possibly due to his need to “be polite” with unfamiliar individuals). During the active target phase (progress

Fig. 2 Participant 1's dynamic conversation target social goals: increase social inquiries and decrease negative statements

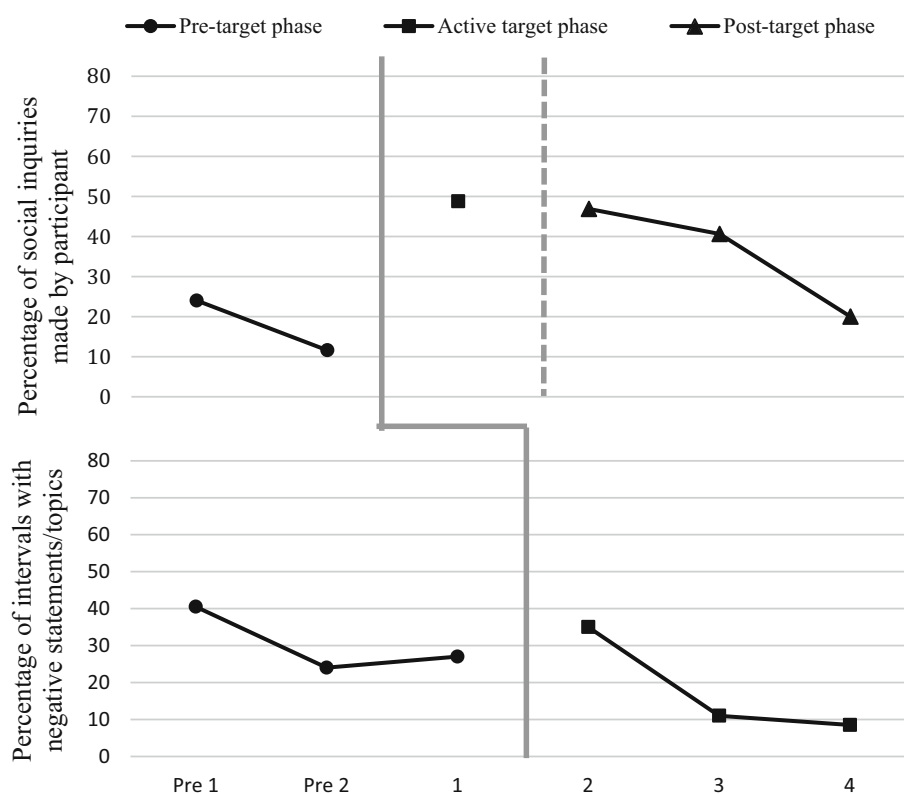
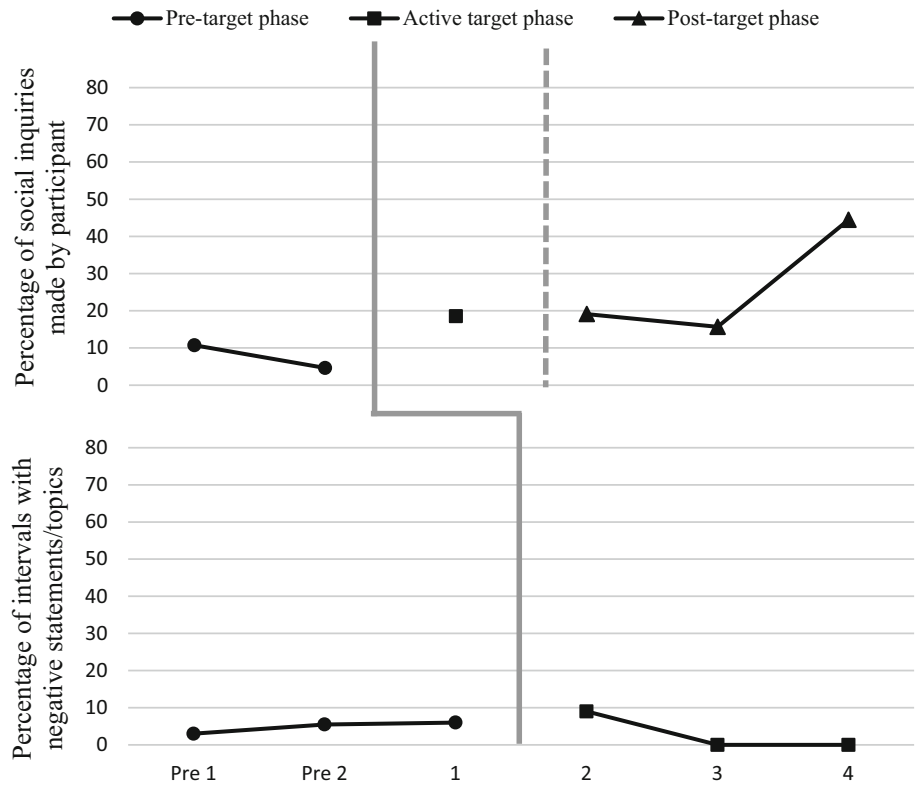


Fig. 3 Participant 2’s dynamic conversation target social goals: increase social inquiries and decrease negative statements

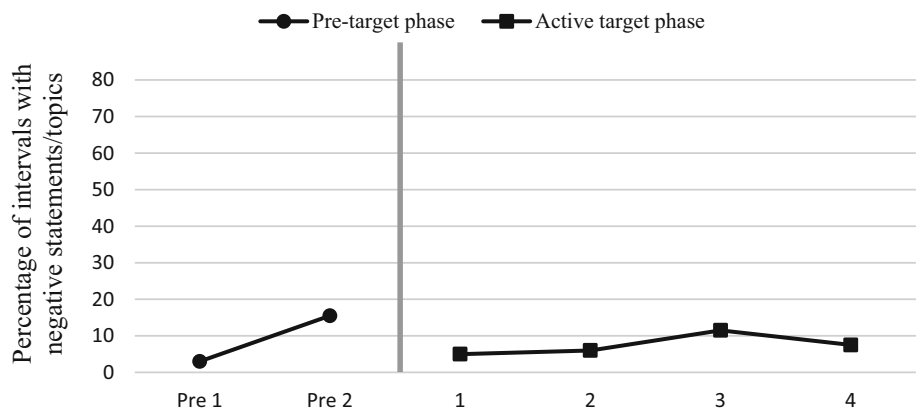


meetings 2-4), his percentage of negative statements initially increased to 9.0 % but then decreased to 0 % for the remaining 2 progress meetings (overall mean of 3.0 %). The effect size for Participant 2’s decrease in negative statements was indicative of a medium effect ($d = -0.48$). Participant 2’s data is depicted in Fig. 3.

Participant 3: Decrease Negative Statements

Participant 3’s individual target focused on decreasing reliance on negative statements throughout the entire duration of the 20-week intervention. Prior to intervention, his percent of conversational intervals with negative statements ranged from 3.0 to 15.5 % (a mean of 9.3 %)

Fig. 4 Participant 3’s dynamic conversation target social goal: decrease negative statements



and during the active target phase ranged from 5 to 11.5 % (a mean of 7.5 %). The calculated effect size is indicative of a medium effect size ($d = -0.41$), although a visual inspection of the data reveals a significant overlap in the pre-intervention and intervention data and lack of a clear treatment effect. Participant 3’s data is depicted in Fig. 4.

Participant 4. Increase Social Inquiries and Decrease Verbal Contributions

Due to a participant unavailability due to a personal obligation, Participant 4 was only able to complete a single pre-intervention session for conversation probes. At that time, the percent of her social inquiries was 27 % (7.5

questions per conversation). During her active target skill phase (following the first five sessions and measured at progress meeting 1) the percentage increased to a mean of 40.0 % of total social inquiries made in the conversation (16.5 questions). During the post-target phase when social inquiries were no longer the focus of self-management (progress meetings 2–4), Participant 4's percentage of total social inquiries remained at a mean of 32.3 % (range of 27–35 %) with a total mean of 10.8 questions (range of 5–15). This sustained improvement was indicative of a large effect ($d = 1.54$).

Participant 4's target objective shifted to focus on reducing her verbal contributions for sessions 6–20 (and assessed during progress meetings 2–4). During the pre-target phase, her verbal contributions made up a mean of 75 % of conversational intervals (range of 71–79 %). During the active target phase (progress meetings 2–4), she reduced her verbal contributions to a mean of 61 % (range of 51–70 %), with a notable decreasing trend in her data. This change was indicative of a large effect ($d = -1.74$). Participant 4's data is depicted in Fig. 5.

Participant 5: Increase Social Inquiries and Increase Verbal Contributions

Participant 5 did not make any social inquiries (0) during her pre-intervention conversation probes. When this skill

was actively targeted (progress meetings 1–2), the percent of social inquiries made increased to a mean of 31.0 % of the total questions asked (range of 27.8–34.2 %). She asked a mean of 5.8 questions per conversation (range of 3–9). During the post-target phase (progress meetings 3–4), she made a total of 26.6 % of the total social inquiries in the conversation (range of 14.3–38.9 %), asking a mean of 5.5 questions (range of 4–7). The increase from pre-intervention is indicative of a large effect size ($d = 3.30$).

After targeting social inquiries, Participant 5's target goal shifted to increasing her verbal contributions for the final two progress meetings. During the pre-target phase she spoke during a mean of 43.1 % of conversational intervals (range of 36.0–51.0 %). When verbal contributions became the active treatment target, Participant 5's contributions increased to a mean of 62.5 % (range of 57.5–67.5 %) for progress meetings 3 and 4. This change was indicative of a large effect size ($d = 2.90$). Participant 5's data is depicted in Fig. 6.

Participant 6: Increase Social Inquiries and Decrease Negative Statements

Participant 6 contributed minimally to the total social inquiries that were made during his pre-intervention conversation probes, making up a mean of 1 % of total questions asked (range of 0–1.6 %). He made a total mean of

Fig. 5 Participant 4's dynamic conversation target social goal: increase social inquiries and decrease verbal contributions

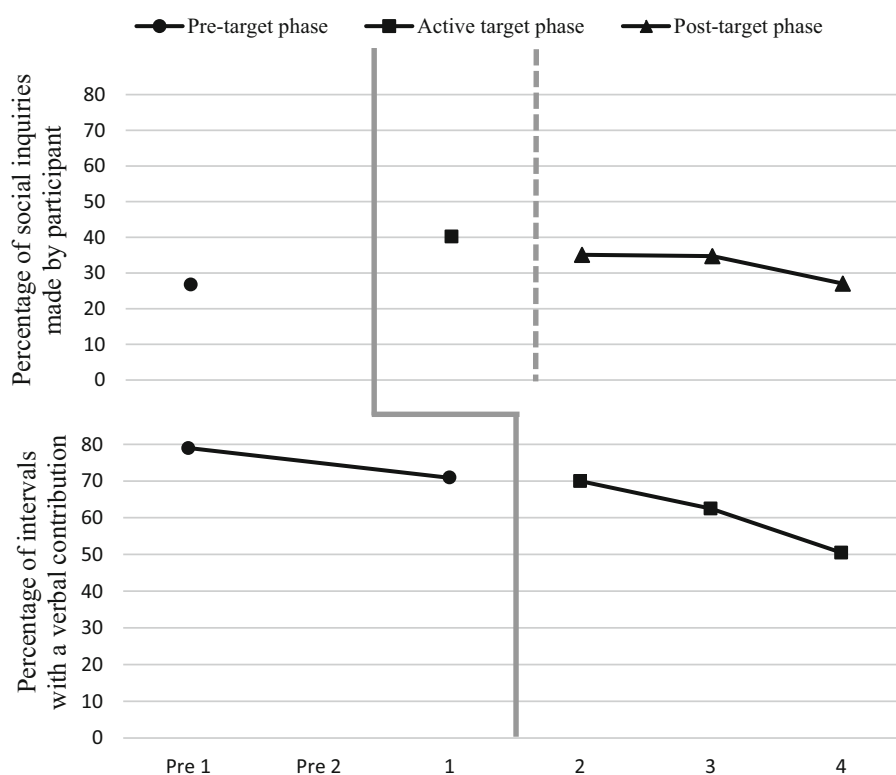
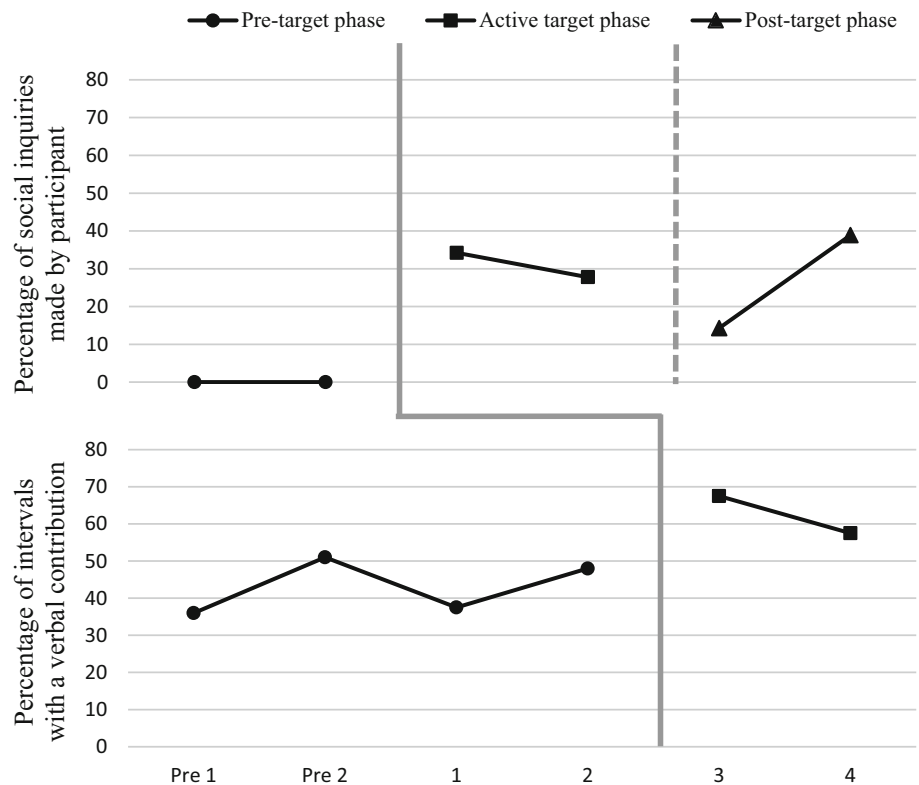


Fig. 6 Participant 5’s dynamic conversation target social goals: increase social inquiries and increase verbal contributions



0.3 social inquiries (range of 0–1.0). Social inquiries were actively targeted during progress meetings 1–3 and the percent of inquiries made increased to a mean of 11.2 (range of 3.8–21.4 %), with his total number of questions increasing to a mean of 2.2 (range of 1–5 per conversation). During his one post-target phase probe (progress meeting 4), he asked 4 % of the total questions asked (mean of 1 question). Overall, the increase in Participant 6’s question asking was indicative of a large effect ($d = 1.29$).

During the final five weeks of the START group, Participant 6’s target focus shifted to decreasing negative statements. During the pre-target phase (both pre-intervention meetings and progress meetings 1–3), he made a negative statement an average of 27.8 % of conversational intervals (range of 0–61.0 %). During the active target phase, Participant 6’s use of negative statements decreased to 21.0 %, which was indicative of a large effect ($d = -0.91$).

Participant 6’s data is depicted in Fig. 7.

Social Validity Ratings

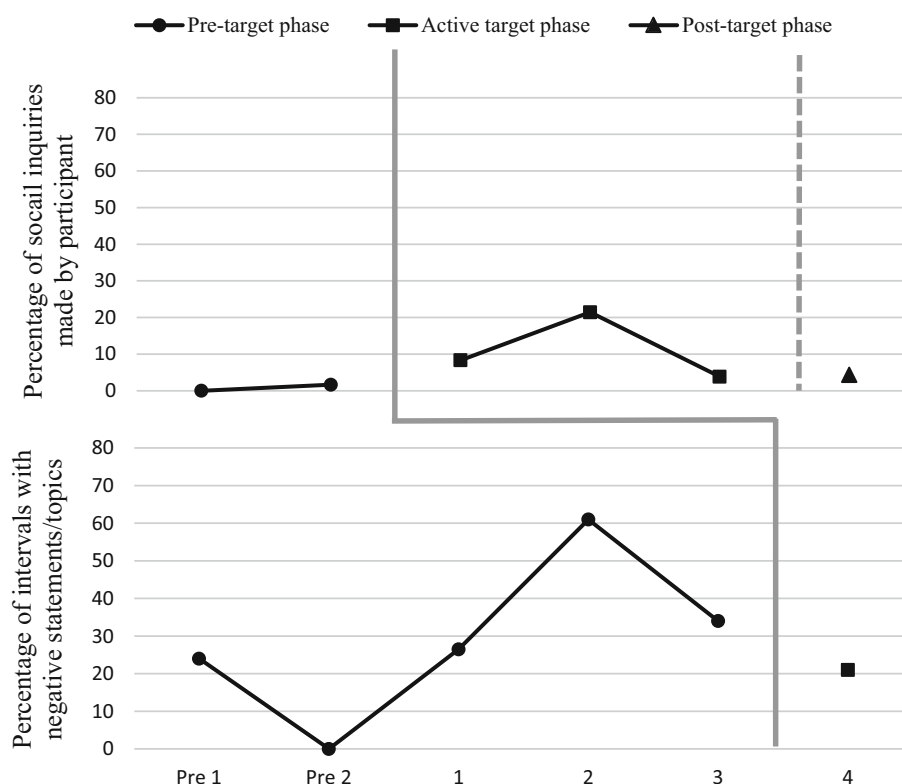
All parents endorsed ratings indicating that their adolescent highly enjoyed being a part of the social skills group (mean rating of 8.58 out of 10, $SD = 1.11$). Additionally, they endorsed that their child’s social skills and competence improved through participation in the group (mean of 7.83 out of 10, $SD = 0.98$).

The participants also indicated that they highly enjoyed their time in the groups (mean rating of 8.33 out of 10, $SD = 1.63$). They also endorsed that their social skills and competence improved through participation in the group (mean of 8.17 out of 10, $SD = 1.33$).

Discussion

To ascertain meaningful information about social skill improvements from the survey data, the mean of the last two progress meeting data points (meetings 3 and 4) were compared to the mean of both pre-intervention data points. In this preliminary investigation, participants were noted to demonstrate some promising evidence of improvement across several of the utilized parent and adolescent survey report measures. Among measures with corresponding parent and self-report versions, the adolescents consistently rated themselves as more socially competent than their parents rated them at all time points. These findings align with previous studies (e.g. McMahon and Solomon 2015; Lerner et al. 2012) and suggest that in general, adolescents with ASD may overestimate their relative level of social aptitude. Whereas these survey measures assessed important parent and adolescent perspectives on social functioning improvements, the use of data extracted from live conversation probes also contributed valuable information about their social competence profiles.

Fig. 7 Participant 6's dynamic conversation target goals: increase social inquiries and reduce negative statements



The conversational skill data are indicative of encouraging improvements to a range of individualized social difficulties—making social inquiries, decreasing negative statements, and increasing or decreasing total verbal contributions during social exchanges. These findings varied in terms of the magnitude of the treatment effect, but seem to provide preliminary evidence of the value of incorporating individualized target skills, experiential opportunities, and self-management into a socialization program. The conversational target skill data provides promising evidence of both (a) the potential benefits of individualizing some aspects of a group socialization curriculum and (b) the utility of using serial conversation probes as a novel means to assess social competence improvements.

Dynamic (live) social performance measures are only rarely used in the social skills intervention research literature, with most programs relying on survey measures as their primary outcome measures (Bolte and Diehl 2013; McMahon et al. 2013a). Live measures may yield more ecologically valid data (Elliott and Gresham 1987; McMahon et al. 2013b; Merrell 2001) and are immune or less susceptible to social desirability biases, random responding, and demand characteristic issues that are recognized as limitations to survey measures (Furr and Funder 2007; Moskowitz 1986).

Social competence is perhaps best encapsulated as one's level of success within live, dynamic exchanges with peers. Therefore, it is logical that evaluations of

social competence (and the programs that aim to improve such competencies) incorporate live, dynamic performance measures as evaluative strategies. To our knowledge, this preliminary investigation is one of the first socialization interventions to incorporate serial conversation probes to augment the use of more traditional social survey measures when assessing improvements to interpersonal functioning.

Autism spectrum disorder can be conceptualized as a disorder of socialization, with its very diagnostic criteria presupposing impairments in social motivation and functioning (American Psychiatric Association 2013). Because of the pervasive and complex nature of interpersonal vulnerabilities associated with ASD (Bauminger 2002; Bauminger and Kasari 2000), which can often be intertwined with a long history of social rejection or isolation (e.g. Chamberlain et al. 2007), adolescents with ASD are likely to require a unique training program that simultaneously attends to multiple treatment considerations. The diverse profiles of adolescents with ASD create a unique challenge for the development of an effective social skills intervention program (Weiss and Harris 2001; Matson et al. 2007). A program that exclusively focuses on didactic social skills acquisition is unlikely to benefit those with low motivation to engage with others and/or those who only have access to nonreciprocal social partners. On the other hand, an intervention that solely provides a highly motivating experiential social context may be suitable for relatively

sophisticated individuals, but is unlikely to benefit to those who lack knowledge of basic socialization strategies.

The hybrid experiential and didactic components of the START program were designed to directly address the diverse needs of the population within a low-demand, high-motivation context. The resulting social validity ratings from the parent and participant adolescents of this intervention were quite favorable—possibly because this preliminary evaluation incorporated engaging components similar to existing afterschool clubs and utilized a cohort of peers and social facilitators. Both participants and their parents endorsed a high level of satisfaction with the social group curriculum and the adolescents appeared to build strong group relationships. These observations and feedback are not inconsequential, as an effective social skills curriculum requires strong buy-in from both adolescent and parent stakeholders. Motivation for continued participation is essential, and the described program intentionally embedded several components for boosting and maintaining social interest and camaraderie (i.e., use of college-aged social facilitators, a variety of group activities and games, the provision of snacks, and a hands-on experiential emphasis).

The opportunity to interact with peers and jointly work on social skills in an experiential setting may be preferable to attending a social skills group facilitated solely by adult professionals. Because everyone in the program (including the college-aged social facilitators) jointly completed the self-management tasks and social lessons, there may have also been a minimization of the inherent stigma traditionally associated with having to acknowledge one's social deficits. The intervention setting was designed to closely mirror real-world socialization settings to help build confidence and competence across structured and unstructured social situations.

It should be noted that there were several limitations to the current preliminary investigation. The repeated measure clinical case series component of this investigation was non-experimental in nature, with no contrast group that would allow for controlled comparisons. This limitation is somewhat tempered by the addition of the multiple baseline design for the dynamic conversation probe data, which allowed the participants to serve as their own controls for their individualized target behaviors. Baseline phases were staggered across participants and behaviors, ranging from one to five time-points. Multiple baseline designs are considered a rigorous single-case experimental design (Barlow et al. 2009).

In the current study, the small sample size also limits the generalization of the preliminary findings. While some promising initial outcomes were observed among our small

sample, a larger pool of participants is required to identify how universally applicable this intervention package would be to the broader population of adolescents with ASD. Additionally, no data was collected on the quality of the participants' interactions in real world social settings during or after the conclusion of the program. Such information is necessary for a comprehensive understanding of the generalized effects of program participation. To address these concerns, a randomized controlled trial is currently underway to further investigate the merits of the START program with increased methodological rigor, a significantly increased sample size, and long-term follow-up data.

Our initial findings suggest that the START social skills program may serve as a promising intervention for improving the social competence of adolescents with ASD. Based on our preliminary data, adolescents who participated in our multi-component social club appear to experience indications of improvement to social functioning, as measured by survey and live conversational measures. Following participation, these individuals seem to be equipped with an improved social skill set and associated level of social motivation, informed by an increased understanding of social rules and expectations. Social competence is essential at all ages, but perhaps more so during the critical transition to young adulthood (Hendricks and Wehman 2009). This time period is often accompanied by a significant decrease in external support as adolescents graduate from high school and age out of federally-mandated special education services (Camarena and Sarigiani 2009). Therefore, prior to this transitional time point, it may be crucial to equip adolescents with ASD with a core set of social competencies to maximize their long-term quality of life and create strong opportunities for increased independent living. Ultimately, interpersonal aptitude largely governs their ultimate level of success in many of life's pursuits, including the obtainment of desirable employment, development of meaningful friendships, and establishment of romantic relationships (Burt et al. 1991; Eaves and Ho 2008; Hurlbutt and Chalmers 2002).

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Author Contributions TV and AM jointly developed the START intervention model and conducted the preliminary evaluation trial. JK assisted with intervention model development. VW served as the lead research assistant on this project and assisted with data input, organization, and analysis. All authors contributed to significant portions of the manuscript drafting and revision process.

Appendix 1: Social Competency and Motivation Scale

Instructions: For each question, please indicate how much you agree with each of the following statements by selecting ONE of the following choices. If you are unsure, please make your best guess.

	Not at all	Rarely	Sometimes	Usually	Almost Always
My child is comfortable in social situations	1	2	3	4	5
My child knows how to interact with an unfamiliar person	1	2	3	4	5
My child is willing to go out in public by him/herself	1	2	3	4	5
My child knows how to make friends with other individuals his/her age	1	2	3	4	5
My child makes eye contact with people when talking to them	1	2	3	4	5
My child maintains conversations by asking questions	1	2	3	4	5
My child maintains conversations by making comments	1	2	3	4	5
My child stays on topic during conversations	1	2	3	4	5
My child brings up appropriate conversation topics	1	2	3	4	5
My child greets others appropriately	1	2	3	4	5
My child introduces him/herself appropriately	1	2	3	4	5
My child ends conversations appropriately	1	2	3	4	5
My child uses appropriate voice volume/rate intonation when speaking	1	2	3	4	5
My child exhibits appropriate facial expressions when talking with others	1	2	3	4	5
My child verbally expresses empathy for others	1	2	3	4	5
My child compliments others	1	2	3	4	5
My child uses age-appropriate humor	1	2	3	4	5
My child has an interest in other people	1	2	3	4	5
My child wants to have friends	1	2	3	4	5
My child knows how to behave when he/she is at a party	1	2	3	4	5
My child prefers to be with other people during his/her free time	1	2	3	4	5
My child loves to talk to other people	1	2	3	4	5
My child likes to learn about the experiences of other people	1	2	3	4	5
My child feels comfortable going out with peers in group outings	1	2	3	4	5
My child goes over to friends' houses or has them come to our house	1	2	3	4	5
My child is skilled in maintaining relationships over time	1	2	3	4	5

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