A peer-mediated intervention to improve the conversational skills of high school students with Autism Spectrum Disorder

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\textbf{Abstract}

\textbf{Background:} Social-communication deficits of adolescents with Autism Spectrum Disorder (ASD) can significantly interfere with their participation in high school activities, where conversation is the primary mode of social interaction. The purpose of this study was to extend the social-communication research in high school settings by evaluating use of a peer-mediated intervention (PMI) during lunch on the conversational skills of three adolescents with ASD who were observed to be passive or reluctant conversationalists.

\textbf{Method:} A multiple-baseline design across participants was used to assess the effects of teaching typical peers strategies for facilitating conversation with the focal students. Peers served as the primary interventionists, but as in other PMI research, we also incorporated the use of written text cues and direct instruction for the focal students, with the aim of using text cues flexibly for a more natural conversation.

\textbf{Results:} Results indicated improvements in focal students’ conversational skills including an increased number of conversational acts, initiations, and follow-up questions, and longer conversational episodes with peers. Overall assertive acts (i.e., responses not contingent upon peer requests) also increased, suggesting that the once passive conversationalists were becoming more assertive. Social validity outcome measures attested to the acceptability of the PMI and the quality of conversation between focal students and peers.

\textbf{Conclusions:} The results of this study provide preliminary evidence that PMI can produce substantial and socially-validated conversational outcomes for high school students with ASD.

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1. Introduction

Social-communication difficulties of adolescents with Autism Spectrum Disorder (ASD) can significantly interfere with their full participation in high school social activities where conversation is the primary mode of social interaction (Carter et al., 2014). The increased demand for social conversation during adolescence often serves to widen the social gap between students with ASD and their typically developing peers, leaving many teenagers with ASD marginalized and socially isolated.

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Interventions are needed to address conversational difficulties and prevent them from negatively affecting future adult friendships, employment, mental health, and overall quality of life (Hendricks & Wehman, 2009). At a time when conversation skills are most needed, intervention should be a priority; however, researchers (e.g., Bellini, Peters, Benner, & Hopf, 2007; Kucharczyk et al., 2015; Reichow & Volkmar, 2010) have consistently documented the relative absence of social-communication interventions for this age group.

Common conversational deficits identified in individuals with ASD include difficulties with initiating (i.e., starting conversations and introducing new topics), maintaining and extending topics of conversation by commenting and asking follow-up questions, and sustaining reciprocal responses or multiple turns within conversations (Jones & Schwartz, 2009; Paul, Orlowski, Marcinko, & Volmar, 2009). These conversational difficulties may vary widely across individuals with ASD, requiring individualized interventions. Although not specifically developed for those with ASD, Fey’s (1986) conversation classification model is useful for understanding the various ways conversation can break down for this population, and could assist with assessing and targeting complex behaviors needed for effective conversation. Fey described three types of ineffective conversationalists. The passive conversationalist responds to partners’ requests for communication, but rarely engages in assertive acts (i.e., responses that are non-contingent upon partners’ requests) such as initiating, commenting, or asking questions to maintain or extend conversation. The inactive or reluctant communicator rarely engages in assertive conversational acts, and in addition is highly unresponsive to partners’ requests and may actively avoid interaction. The verbal non-communicator engages in frequent assertive conversational acts, but is highly unresponsive to conversational partners’ requests and interests (i.e., dominates conversation, shows little interest in what others say). According to Fey, the ultimate goal of conversation intervention is to help ineffective conversationalists become active conversationalists who are appropriately assertive and responsive to their partners’ communications.

In addition to individualization, effective interventions for this population must include strategies that result in improved social-communication competence in natural settings (Rao, Biedel, & Murray, 2008). Peer mediated intervention (PMI) is one approach that has been successfully used to improve social-communication skills in individuals with ASD (e.g., Hochman, Carter, Bottema-Buetel, Harvey, & Gustafson, 2015; Kamps, Mason et al., 2014; Kamps, Thiemann-Bourque et al., 2014; Thiemann & Goldstein, 2004), and is considered to be an evidence-based practice by both the National Professional Development Center on ASD (Wong et al., 2015) and the National Autism Center (NAC, 2015). With this approach, typically-developing peers are taught strategies for social interaction, thus expanding the availability of supportive partners and increasing opportunities for individuals with ASD to learn and practice new skills in natural contexts. Because peers are the natural experts in age-appropriate conversation, PMI would appear to be an excellent fit for high school students with ASD (Carter et al., 2014).

Although comprehensive reviews (e.g., Chan et al., 2009; Watkins et al., 2015) indicate that PMI has produced a range of social outcomes, relatively few PMI studies have focused specifically on improving the conversational skills of students with ASD (e.g., Kamps, Mason et al., 2014; Kamps, Thiemann-Bourque et al., 2014; Thiemann & Goldstein, 2004). This paucity of research may be due to the challenges of teaching and measuring complex communication behaviors that facilitate ongoing reciprocal interactions with a social partner (Goldstein, Schneider, & Thiemann, 2007).

In PMI studies targeting conversational skills, researchers (e.g., Ganz et al., 2012; Kamps, Mason et al., 2014; Kamps, Thiemann-Bourque et al., 2014) have often incorporated other evidence-based components (NAC, 2015) such as direct student instruction of specific communication skills and the use of written text cues and scripts, with peer training to enhance intervention effectiveness. For example, in a study involving five elementary-age boys with ASD, Thiemann and Goldstein (2004) found that teaching typical peers facilitative strategies to support conversation impacted four of the five children’s overall initiations and contingent responses. However, improvements in all the boys’ specific communication skills – initiating comments, making compliments, and initiating requests for information – occurred only following systematic instruction of these skills using written text cues for the children with ASD. In addition, the average number of sequential utterances per conversational episode increased over baseline levels for all five boys by the end of the written text instruction, suggesting that they engaged in longer reciprocal responses or multi-turn conversations with their peers.

More recent studies have also documented the effectiveness of a multicomponent PMI approach. Kamps, Mason et al. (2014) used a multiple-baseline design across participants to evaluate the impact of a peer network intervention that combined peer training and direct instruction on specific social-communications skills of four elementary students with ASD during free play. Training involved explicit social skills instruction combined with visual cues within the context of peer networks. Results showed substantial increases in total communication acts (combined initiations and responses) and specific communication skills (e.g., comments, requests to peers) for all four participants with ASD during peer network sessions. In addition, generalization probes during classroom centers showed increased communications following intervention for three of the four participants. In a larger randomized control group study, Kamps, Thiemann-Bourque et al. (2014) compared the effects of a similar peer network intervention on 56 kindergarten and first-grade children with ASD with 39 children in a comparison group. Results showed that children in the PMI group displayed significantly more initiations to peers than did the comparison group during non-treatment social probes and generalization probes. In addition, children in the PMI condition also showed more growth in language and adaptive communication, and treatment session data showed significant growth for total communications over baseline levels.

PMI for high school students with ASD was first introduced in by Haring and Breen (1992), but has been slow to emerge (Chan et al., 2009; Wang et al., 2011; Watkins et al., 2015). Recent studies by Gardner et al. (2014) and Hochman et al. (2015)
used peer networks to promote social interactions and social skills in structured activities in the classroom or during lunch. Results showed increases in social engagement and peer interactions, but the impact on conversational skills was not measured. Other studies by Hughes, Rung, Wehmeyer, Agran, and Copeland (2000), Hughes et al. (2011, 2013) have encouraged interactions in high school settings by instructing adolescents with ASD to interact using communication books, and teaching peers how to facilitate and prompt the focal students to use the books. Results indicated increases in focal student initiations and responses using the books, although initiations were scripted and conversation was limited by the structure and topics of the books.

The purpose of this study was to extend the PMI research in high school settings by evaluating the effects of a PMI on improving the specific conversational skills of adolescents with ASD who were observed to be passive or reluctant conversationalists. Peers served as the primary interventionists to teach new conversational skills, but as in other PMI research, we also incorporated the use of written text cues and direct instruction for the focal students, with the aim of using text cues flexibly for a more natural conversation. Specifically, we addressed the following questions:

1. What are the effects of the PMI on increasing focal students (a) overall conversational acts, (b) initiations, and (c) follow-up questions?
2. Will PMI have a collateral impact on the participants use of comments, which was not targeted for intervention, and total assertive acts (i.e., initiations + follow-up questions + comments)?
3. How will peer participants, focal students, and special educators naïve to the intervention judge the social acceptability and outcomes of the PMI?

2. Method

2.1. Participants: students with ASD and peers

Three focal students with ASD were selected from two high schools in the same mid-size, racially and ethnically diverse urban school district located in the northeast. Selection criteria were: (a) a prior clinical diagnosis or an educational determination of ASD and receiving special education services; (b) ability to communicate verbally and ask questions; (c) ability to read simple sentences; and (d) an expressed willingness to participate in the study. In addition, we selected students who, during social interactions with peers and adults, exhibited low rates of initiations and poor topic maintenance skills (e.g., asked few questions, rarely commented or shared information). The selection process began with teacher nominations for students meeting the criteria, which was then verified through researcher observations conducted across multiple school activities. Additionally, for descriptive purposes, we administered the Childhood Autism Rating Scale, 2nd ed. (CARS2; Schopler, Reichler, & Renner, 2010) and teachers completed the Social Responsiveness Scale (SRS; Constantino, 2005). Focal students attended a “life skills” program and did not participate in general education classes.

Juan (all names are pseudonyms) was a 15-year-old Hispanic freshman also diagnosed with a global neurodevelopmental delay (IQ score unavailable) according to school records. His scores on the CARS2 (T-score = 50) and the SRS (T-score = 66) were both in the mild to moderate range for symptoms of ASD and social behavior deficits. Observations indicated that Juan was a passive communicator who rarely initiated conversation with others, but was responsive to peer and adult requests and showed interest in what others said. He was capable of speaking in full simple sentences, but often responded with one word or a simple phrase, and often used scripted language from television shows or movies when conversing.

Katia was a 14-year-old Hispanic freshman identified with borderline cognitive functioning (WISC-IV Full Scale IQ score of 77) according to school records. Her scores on the CARS2 (T-score = 41) and SRS (T-score = 62) were in the mild to moderate range for symptoms of ASD and social behavior deficits. Compared to the other participants, Katia demonstrated more advanced expressive language skills, speaking in full sentences with multiple phrases. However, she was often unresponsive to peer or adult requests, and avoided social interactions. Katia was hospitalized during the previous school year due to aggressive behaviors at home.

Andres was 15-year-old Hispanic sophomore at the same school as Katia. School records indicated additional diagnoses of Obsessive Compulsive Disorder, and Attention–deficit Hyperactivity Disorder. Additionally, scores on the WISC-IV (Full Scale IQ = 49) indicated a moderate intellectual disability. Scores on the CARS2 (T-score = 44) and SRS (T-score = 65) fell in the mild to moderate range for symptoms of ASD and social behavior deficits. Observations revealed that although Andres could speak in full sentences, he rarely initiated interactions with his classmates or teachers and appeared to display behaviors consistent with social anxiety. He was often unresponsive to peer and adult requests for conversation.

Nine high school junior or senior general education students, ages 16–18 years old, were organized into peer networks, one network for each student with ASD (Juan, 4 peers; Katia, 2 peers; Andres, 3 peers). All peer networks initially had 4 peers; however, 3 peers withdrew at the beginning of the study due to schedule conflicts. The remaining peers included both males (n = 2) and females (n = 6), and were racially and ethnically diverse (4 White, 3 Hispanic, 1 Black, 1 Asian). To recruit peers, we made presentations to service clubs at both high schools asking students to consider participating in a research project to
help students with ASD improve their conversational skills during lunch. Criteria for inclusion were peer availability and expressed interest in interacting with students with ASD.

2.2. Setting and instructors

All observations of the participants’ conversations took place in the high school cafeteria during the focal students’ regularly assigned 30-min lunch period. At both schools, approximately 200 students with disabilities and without disabilities were present in the cafeteria. During observation sessions, the focal student and two peers from the student’s network sat together while they ate lunch; no other activity was introduced. Peers from networks with more than two peers rotated daily across sessions depending on peer availability. Training sessions for the peers and the focal students, held separately, occurred on days when lunch observations did not occur and took place in an empty classroom. Authors 3 and 5, a Ph.D. research scientist and a doctoral student, trained by the first author, served as instructors.

2.3. Written text cue cards and direct instruction

Focal students were provided with two cue cards with written text to elicit initiations and follow-up questions during lunch conversations with their peers. The first cue card for initiations was introduced at the beginning of T2 observations (see Peer Training) and was present for the remainder of the study. It consisted of a 4 × 5-in card with a rule printed on top, “Start a Conversation: Ask a Question or Tell Something” and blank lines below it to write specific topic starters. Prior to each lunch observation, the focal student and the instructor generated ideas about what to say to start a conversation (e.g., “What would you like to talk to your friends about?”), and either the instructor or focal student wrote 3–5 topic starters on the card (e.g., “What did you do this weekend?” “My cat was silly yesterday.”). Thus, depending on what the focal student wanted to talk about, written topic starters changed daily.

The second cue card for follow-up questions was introduced at the beginning of T3 observations and was also present for the remainder of the study. It consisted of a 3 × 5-in card with two rules for asking follow-up questions. The first rule stated, “When your friend asks you a question, answer and ask one back” (e.g., When a partner asks, “How was your weekend?” respond by saying, “Good. How was your weekend?”). The second rule stated, “When your friend tells you something, ask about it” (e.g., When a partner says, “I went shopping yesterday” respond by saying, “What did you buy?”).

Focal students were individually taught how to use each card in 30-min training sessions prior to the lunch observations. Training for each card followed the same format. The instructor first provided a rationale for the cue card and explained the rule. Then, using the same prompting strategies taught to the peers, the instructor role played conversations with the student using the card for about 15 min. Role play ended once the student was able to use the cue card to initiate or ask questions with or without prompts.

2.4. Observations, outcome measures, and recording procedures

All experimental observations of the focal students’ and peers’ lunch conversations were video recorded using a small digital camera located approximately 4 ft from the lunch table. A wireless microphone was positioned at the center of the table to enhance sound quality. Once participants were seated and had opened their lunch, the data collector, who monitored the camera, moved away from the participants’ view and did not interfere with their interaction. A 10-min continuous sample from each recorded session, which provided a sufficient window for observing changes in conversational behavior, was used for data collection. The sample began when the participants were ready to talk, beginning with the first focal student to peer, or peer to focal student, initiation.

Primary outcome measures were the total number of focal student (a) conversational acts (i.e., initiations and responses), (b) initiations, and (c) follow-up questions. For each 10-min video sample, trained observers transcribed all verbalizations and nonverbal gestures (e.g., head nod in response to a question) of both the focal student and peers (only focal student behaviors are reported here) on an Excel spreadsheet formatted for transcription and coding. A conversational act was defined as verbalizations or gestures (i.e., head nod) involving the focal student (i.e., focal student to peer, or peer to focal student) that was separated by at least a 1-s pause. Inappropriate verbalizations, defined individually for each focal student (e.g., stereotypic phrases) and off-topic responses to peer requests were not counted.

Once transcribed, each conversational act was then coded as either an initiation or response. An initiation was defined as a conversational act that began an interaction between the focal student and peer and was not preceded in the previous 5 s by a partner’s conversational act. A response was a conversational act that occurred within 5 s of a partner’s, or one’s own, conversational act. Responses were further coded into three specific response types that functioned to maintain or extend conversational interactions including: (a) an obligatory response that was preceded by a partner’s question or request for communication or action; (b) a follow-up question that requested information or action; or (c) a comment or statement that was not preceded by a partner’s question or request (e.g., “I like that movie too”). In addition, initiations and follow-up questions were coded as prompted if they were immediately preceded by a peer’s verbal (e.g., “Ask me about it”) or gestural mand (e.g., pointing to a cue card) to elicit the response.

Only conversational acts that occurred within a conversational episode were included in the first outcome measure. A conversational episode, which began with an initiation made by the focal student or peer and ended with a 5-s pause in
conversation, consisted of at least three reciprocal turns between partners (e.g., focal student initiation – peer response – focal student response). Thus, an initiation that was not followed by a partner response, or a response to an initiation that was not followed by an additional response by a partner, was not counted in the first measure. To evaluate whether the intervention impacted longer reciprocal responses within conversations, we also calculated the mean number of conversational acts made by the focal student per conversational episode, by dividing the total number of conversational acts by the number or episodes within a 10-min sample.

Finally, to evaluate the collateral effect of the intervention, we tabulated the frequency of comments made by the focal student (not targeted in intervention). Additionally, to determine whether the focal students were becoming more active, as opposed to passive conversationalists, we averaged the total number of assertive acts (initiations + follow-up questions + comments) and compared it to the average number obligatory responses that were in direct response to peer requests.

2.5. Experimental design and conditions

A multiple baseline design across focal students was used to evaluate the effects of the PMI on the focal students’ lunch conversation with their peers. With this design, the PMI was sequentially introduced to each participant, allowing for three demonstrations of experimental control at three different points in time. Observations across experimental conditions (i.e., baseline, peer training, and post training) occurred 3–4 days per week for 18 weeks (school events, closures, and participant absences resulted in some variation) on days the peers did not attend group training or consultation sessions. The number of observation sessions and peer training sessions are indicated in Figs. 1 and 2 (see Section 3).

2.5.1. Baseline

Prior to baseline, the focal students either sat alone or exclusively with other students with disabilities during lunch and rarely engaged in conversation. Two weeks prior to baseline, focal students and peers were introduced and had lunch together for several days to become acquainted with one another and accustomed to the video camera. During the pre-baseline and baseline sessions, peers were instructed to be friendly and include the focal student in lunch conversation as they would any other friend. The focal student was instructed to be friendly and was reminded that this was an opportunity to make new friends. No other instruction was provided.

2.5.2. Peer training

After a minimum of five baseline observations with a predictable data pattern for all primary measures, peer training was sequentially introduced to each peer network. Training consisted of three components that were introduced separately and sequentially to allow for adequate practice and skill acquisition: (a) strategies to support conversation (T1); (b) strategies to promote initiations (T2); and (c) strategies to promote follow-up questions (T3). Training components were introduced in 30-min group network training sessions. All training sessions followed the same general format and instructors used a training outline detailing the procedures. First, the instructor thanked peers for their participation and provided feedback on their conversation and/or use of strategies during lunch. Next, the instructor provided a rationale for the intervention component, described and modeled the strategies, and led a guided practice discussion via handouts with examples and non-examples of strategy use. Finally, the instructor and peers role-played the strategies using scripted and unscripted conversational scenarios.

Immediately prior to each lunch observation, the instructor met with the peers for approximately 5 min in the cafeteria to provide daily feedback on the previous day’s performance and reminders to use the strategies as trained. Based on a video review from the prior lunch observation, the instructor provided praise and corrective feedback. To help peers remember to use their strategies, each peer was given a 3 × 5 in cue card to be placed on the lunch Table that summarized the strategies and communication goals for each component.

2.5.2.1. Strategies to support conversation (T1). Peer training for this component consisted of two group sessions held on consecutive days, plus daily feedback. In the first training session, the instructor discussed conversational and behavioral characteristics of students with ASD and provided a brief overview of each of the three intervention components.

In the second session, the instructor taught the peers five facilitative strategies to support conversational interaction, which was adapted for high school conversation from Thiemann and Goldstein (2001, 2004). The strategies were: (a) Look, listen, and wait (i.e., look for and follow topics of interest, show active listening, and provide time for your partner to initiate and respond); (b) Gain your partner’s attention (i.e., call your partner’s name or touch his or her arm prior to talking if your partner seems distracted); (c) Keep the conversation going (i.e., ask open-ended questions and share information to extend turn-taking); (d) Help your partner respond (i.e., repeat, clarify, or break down a statement if your partner does not respond or appears not to understand); and (e) Move on (i.e., redirect conversation if it becomes repetitive or off-topic).

Following role-play practice at the end of the second training session, peers were directed to use the strategies during lunch, to engage the focal student in conversation for as long as the student seemed interested in a topic, and to wait 10 s before starting a conversation to give the focal student time to initiate. Once we observed an increase in the focal student’s total conversational acts, the second peer training component was introduced.
2.5.2.2. Strategies to promote initiations (T2). This component consisted of one group training session, plus daily feedback. Peers were taught how to encourage and prompt the focal student to start conversations. Specifically, peers were reminded to wait 10 s between conversations (as instructed in T1), while also looking expectantly at the focal student to initiate. If the focal student did not initiate, peers were now instructed to prompt the student to use his or her cue card to start a conversation following a least-to-most prompting hierarchy that was individualized for each student. For example, peers were taught to say, “You start,” while pointing to the student’s cue card, followed by, “Ask me a question or tell me something.” If the focal student did not respond to the prompts, peers were instructed to start a conversation as they did in T1, and then pause and try prompting the student again to begin the next conversation.

During role-play, peers combined the prompting strategy with the facilitative strategies introduced in T1 to sustain conversation on a topic initiated by the focal student. Additionally, peers were instructed to continue to pause, look expectantly, and prompt an initiation (e.g., “You start”) even when the student had used all topic starters on the card to encourage unscripted initiations. Peers were then directed to use the strategies during lunch and were reminded to pause at the end of each conversation to create opportunities for the focal student to initiate a new conversation using his or her card. Once increases for student initiations and a consistent or increased level for total communication acts were observed, we introduced the next training component.

2.5.2.3. Strategies to promote follow-up questions (T3). This component consisted of two non-consecutive group training sessions, plus daily feedback. Peers were taught strategies to encourage and prompt the focal student to ask questions to sustain a conversation once it began by following the two rules for asking follow-up questions shown on the student’s cue card. During guided discussions and role-play in the first T3 training, peers practiced posing a question that could be repeated (e.g., “Did you like the pep rally?”) and making a statement that shared information (e.g. “I had the best weekend ever!”), pausing for a focal student response, and then prompting a question if the student did not respond by either saying, “Ask me back” or “Ask me about it.” Prompts were individualized for the focal students. For example, because Juan sometimes had difficulty generating questions, these prompts were paired with a model (e.g., “Ask me back: say, ‘Did you like the pep rally?’”). If the focal student did not respond to peer prompts, peers were instructed to continue the conversation as before, and to try again later after presenting another opportunity to ask a follow-up question.

After role-play, peers were directed to use the new strategies during lunch to promote the focal students’ use of follow-up questions, and to continue using the strategies for initiations and supporting conversation introduced during T1 and T2. After three or four lunch observations, peers attended a second T3 group training. This session provided additional practice and feedback on combining the use of all strategies to facilitate natural conversational interactions.

2.5.3. Post training

All training sessions and daily feedback for peers were discontinued once improvements above baseline levels were observed for the focal student on all three primary measures. Peers were directed to continue to use their strategies during lunch, and peer and focal student cue cards were maintained. The instructor continued to meet the focal students prior to lunch to generate topic starters. To support peers’ continued implementation of the intervention, peer networks attended weekly consultation sessions with the instructor (Haring & Breen, 1992). The instructor involved the peers in discussion and problem-solving around the previous week’s interactions, their use of the strategies, and the focal student’s progress in sustaining conversation and using targeted skills. To facilitate discussion, peers were shown graphs of the focal student’s progress and positive video examples of their interactions.

2.6. Observer training and inter-observer agreement

Prior to data recording, a pool of four observers (graduate research assistants) were trained to code dependent measures from conversations on videos recorded between peers and students with ASD from a preliminary study and practiced until they achieved 80% agreement on all primary outcome measures on three consecutive video samples. Inter-observer agreement was assessed on 30% of the observation sessions for each student in each phase. Two observers independently transcribed and coded the same 10-min video sample on an Excel spreadsheet. Transcripts between observers were compared point-by-point on a conversational act-by-conversational act and code designation-by-code designation basis. An agreement for a conversational act was noted when both observers transcribed the same verbalization or nonverbal gesture within the same sequence in the transcript; slight wording variations were acceptable (e.g., “I’m good” or “Good”). A disagreement was noted when one observer transcribed a conversational act that the other did not. An agreement on code designation was defined as an identical rating for an initiation, response, and response type for each conversational act. Non-agreements were defined as one observer coding something different than the other. Mean percentage agreement was calculated by dividing the number of agreements, by the total number of agreements plus disagreements multiplied by 100 on each primary measure. Mean agreement across the three focal students was 87.9% for all conversational acts (range = 85.6 – 91.1%), 100% for prompted initiations, 88.4% for unprompted initiation (range = 83.9–98%), 87.2% for comments (range = 83.4 – 89.7%), and 96.7% for obligatory responses (range = 95.7–97.6%).
Percentage agreement was also calculated on the mean number of conversational acts per episode computed by each observer, which was determined by dividing the smaller number obtained by one observer by the larger number obtained by the other and multiplying by 100. Percentage agreement across the focal students was 89.3% (range = 85.4–94.4%).

2.7. Fidelity measures

A total of 86% of all peer group training sessions, distributed across the two instructors and peer networks, were observed by a trained observer using a 6-item checklist to indicate whether essential elements of each training component (e.g., rationale, introduction of the strategies, role play, feedback) were implemented. Mean fidelity was 98.6% (range = 83.3–100%). Post training consultation sessions were observed on 50% of all sessions distributed across instructors and peer networks with a 6-item checklist to determine whether core components (e.g., review of previous week’s interactions, group discussion and problem solving) were implemented. Mean was 100%. Using a 3-item checklist, procedural fidelity of observations was assessed on 46% of all training and post training observations distributed across instructors and participants to indicate whether peers received daily feedback (training only), and the peers and focal students’ cue cards were present. Mean fidelity was 100%.

2.8. Social validity

Social validity was evaluated in three ways. First, at the conclusion of the study, peers completed an 11-item acceptability survey using a 7-point Likert-type scale adapted from the School Intervention Rating Form (SIRF; Harrison, State, Evans, & Schamburg, 2015). Items pertain to the acceptability of the peer training and peer-mediated intervention strategies, the ease of learning and implementing the strategies, and the perceived impact of the intervention on producing positive outcomes for the focal student and themselves. After the peers completed the survey, we held and recorded follow-up discussions with the peer networks to gather more detail.

Second, focal students were asked to rate their satisfaction with conversations with their peers at the end of baseline and post training, using a 6-item 5-point Likert-type scale (1 = not at all or never, 3 = so-so, 5 = a lot, very easy, or always). Items asked students to rate (a) whether they enjoyed and felt comfortable having conversations with their friends, (b) whether their friends seemed to enjoy their conversations and felt comfortable with them, (c) whether it was easy to have conversations with their friends, and (d) whether conversations were similar to conversations they had with their other friends.

Third, five special education teachers and three paraprofessionals from the participants’ high schools who were naïve to the experimental conditions, rated changes in the quality of conversational interactions. Two 4 min representative video samples from baseline and post training observations of the focal students with the same peers were shown to the educators in small groups. The presentation order of the baseline and post training videos and the focal student and peers were counterbalanced for each showing and were presented blind to the educators (e.g., they were not told about the experimental conditions and post training videos did not show cue cards). After viewing each pre- and post training video segment, the educators independently rated the conversational behaviors of the focal student, the peers, and the overall quality of the conversational interaction by completing 5 point Likert-type scale (i.e., 1 = strongly disagree, 3 = neutral, 5 = strongly agree). Items are shown in Table 4.

2.9. Data analysis

Visual analysis was first conducted to inspect changes in level, trend, variability, and immediacy of effect across experimental conditions for the three graphed primary outcome measures. Next, to determine the magnitude of change for the PMI (peer training and post training conditions combined), Tau-U, a non-parametric effect size index that controls level and baseline trend, was employed (Parker, Vannest, Davis, & Sauber, 2011). Individual and weighted average Tau-U’s (baseline vs. combined PMI phases) with p values and 90% confidence intervals were generated through a web-based calculator (Vannest, Parker, & Gonen, 2011). Tau-U ranges from 0 to 1; a score between 0 and 0.65 is interpreted as no/weak effects, 0.66-0.92 as moderate effects, and 0.93–1.0 as large effects (Parker et al., 2011).

3. Results

3.1. Conversational acts

Results for the focal students’ number of conversational acts (including all prompted and unprompted responses) appear in Fig. 1. During baseline, Juan exhibited the highest number of conversational acts (M = 33.5), whereas Katia (M = 13.7) and Andres (M = 14.5) showed consistently low levels despite having lunch with their peers for many weeks. Although Juan’s baseline data were higher and more variable than the other two students’, his conversational acts almost entirely consisted of obligatory responses. During peer training, the number of conversational acts substantially increased for Juan (M = 77.8), Katia (M = 52.6), and Andres (M = 56.3). An immediate change in trend and level occurred for Juan beginning with the first training component (T1), while changes occurred more gradually for Katia and Andres as each peer training component was
added (T1, T2, and T3). During the post training condition, conversational acts continued to remain well above baseline levels for Juan (M = 67.9), Katia (M = 75.8), and Andres (M = 50.6), despite some variability for Juan and a drop in communication acts for Andres when compared to the peer training condition. Katia demonstrated the highest number of conversation acts during post training, but her participation ended when she moved to a residential school due to problem behaviors at home. Post training data gaps for Katia reflect absences and refusals to participate in school activities. As seen in Table 1, Tau-U
Fig. 2. Number of initiations (dots) and follow-up questions (bars) across conditions and participants.
Table 1

Tau-U effect sizes for conversational acts, initiations, and follow-up questions.

<table>
<thead>
<tr>
<th></th>
<th>Juan</th>
<th>Katia</th>
<th>Andres</th>
<th>Weighted average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversational acts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tau-U</td>
<td>0.90</td>
<td>0.92</td>
<td>0.97</td>
<td>0.94</td>
</tr>
<tr>
<td>90% CI</td>
<td>[0.48, 1.33]</td>
<td>[0.59, 1.26]</td>
<td>[0.68, 1.26]</td>
<td>[0.73, 1.14]</td>
</tr>
<tr>
<td>Initiations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tau-U</td>
<td>0.75</td>
<td>0.75</td>
<td>0.69</td>
<td>0.73</td>
</tr>
<tr>
<td>90% CI</td>
<td>[0.33, 1.18]</td>
<td>[0.41, 1.09]</td>
<td>[0.39, 0.98]</td>
<td>[0.52, 0.93]</td>
</tr>
<tr>
<td>Follow-up questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tau-U</td>
<td>0.94</td>
<td>0.75</td>
<td>0.76</td>
<td>0.81</td>
</tr>
<tr>
<td>90% CI</td>
<td>[0.51, 1.36]</td>
<td>[0.41, 1.09]</td>
<td>[0.47, 1.05]</td>
<td>[0.60, 1.01]</td>
</tr>
</tbody>
</table>

Note: CI = confidence interval; p < 0.01 for all effect sizes.

effect sizes for conversational acts ranged from 0.90 to 0.97, demonstrating moderate to large intervention effects for all students (weighted average 0.94).

Table 2 shows the average number and range of conversational acts per episode across conditions. Baseline levels were consistently low for all students, indicating that pre-intervention conversations were relatively brief for Juan (M = 4.8), Katia (M = 3.3) and Andres (M = 2.5). However, during the peer training and post training conditions, the average number of conversational acts per episode increased over baseline levels for each student, with the highest average for Juan (M = 9.2) and Katia (M = 8.8) occurring post training. Although Andres’ average during post training (M = 4.4) was lower than in the peer training condition (M = 5.6), it was nearly double his baseline average (M = 2.5).

3.2. Initiations and follow-up questions

The number of focal student initiations and follow-up questions (prompted and unprompted combined) across all experimental conditions are displayed in Fig. 2 (see Table 3 for means). Each student rarely initiated conversation or asked follow-up questions during baseline. Although Andres occasionally initiated, his overall conversational acts and average responses within conversational episodes, remained low, and his initiations steadily declined prior to T1. As shown in Fig. 2, the introduction of the first peer training component (T1) had little or no effect on the focal students’ initiations or follow-up questions. However, once peers implemented strategies to promote initiations and cue cards for initiations were introduced to the focal students during T2, immediate increases for both initiations and follow-up questions occurred for all focal students. Then during T3, when peers implemented strategies to promote follow-up questions and cue cards for follow-up questions were introduced, the number of follow-up questions increased again for Juan and Katia. Andres’ initiations and follow-up questions remained variable during T3. During post training intervention, all students continued to initiate and ask follow-up questions well above baseline levels, although Juan’s responses were variable and Andres’s initiations decreased during the last three sessions. Katia’s level of initiations and follow-up questions was the highest during post training. As shown in Table 1, Tau-U effect sizes ranged from 0.69 to 0.94, demonstrating moderate to large intervention effects for initiations and follow-up questions across students (weighted average 0.73 for initiations and 0.81 for follow-up questions).

Table 2 shows a breakdown of the average number of prompted and unprompted initiations and follow-up questions across experimental conditions. As shown, unprompted initiations and follow-up questions for all students were substantially greater than prompted responses during the training and post training intervention conditions. Additional analysis of data for unprompted initiations revealed that the proportion of unscripted initiations (questions or statements not written on the cue card) was higher than scripted responses (same or similar wording to the written text) for all focal students during training and post training conditions, with an average percentage and range of unscripted initiations of 65% (0–100%), 74% (30–100%), and 94% (62–100%) for Juan, Katia, and Andres, respectively.

Table 2

Average number and range of conversational acts per episode across conditions.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Peer training</th>
<th>Post training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>Range</td>
<td>M</td>
</tr>
<tr>
<td>Juan</td>
<td>4.8</td>
<td>2.1–10.0</td>
<td>8.8</td>
</tr>
<tr>
<td>Katia</td>
<td>3.3</td>
<td>1.0–9.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Andres</td>
<td>2.5</td>
<td>1.5–3.2</td>
<td>5.6</td>
</tr>
</tbody>
</table>
Table 3
Average Number of Prompted and Unprompted Initiations and Follow-up Questions Across Conditions.

<table>
<thead>
<tr>
<th></th>
<th>Juan</th>
<th>Katia</th>
<th>Andres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>T</td>
<td>PT</td>
</tr>
<tr>
<td>Initiations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prompted</td>
<td>0.0</td>
<td>0.9</td>
<td>1.5</td>
</tr>
<tr>
<td>unprompted</td>
<td>0.2</td>
<td>2.4</td>
<td>2.6</td>
</tr>
<tr>
<td>Follow-up questions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prompted</td>
<td>0.0</td>
<td>1.4</td>
<td>2.0</td>
</tr>
<tr>
<td>unprompted</td>
<td>0.7</td>
<td>9.4</td>
<td>11.5</td>
</tr>
</tbody>
</table>

Note: B = baseline; T = peer training; PT = post training.

Table 4
Average number of assertive acts and obligatory responses across conditions.

<table>
<thead>
<tr>
<th></th>
<th>Juan</th>
<th>Katia</th>
<th>Andres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>T</td>
<td>PT</td>
</tr>
<tr>
<td>Assertive acts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>0.2</td>
<td>3.4</td>
<td>4.1</td>
</tr>
<tr>
<td>Follow-up questions</td>
<td>0.7</td>
<td>10.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Comments</td>
<td>3.2</td>
<td>13.3</td>
<td>11.5</td>
</tr>
<tr>
<td>Total</td>
<td>4.1</td>
<td>27.4</td>
<td>29.0</td>
</tr>
<tr>
<td>Obligatory responses</td>
<td>30.2</td>
<td>45.9</td>
<td>37.5</td>
</tr>
</tbody>
</table>

Note: B = baseline; T = peer training; PT = post training.

3.3. Comments and total assertive versus obligatory conversation acts

Table 4 shows the mean frequency of total assertive conversational acts broken down by specific acts (initiations, follow-up questions, and comments) compared to obligatory acts made by the focal students across conditions (prompted and unprompted responses included). Although we did not target focal student comments in our intervention, the data show substantial mean increases for all students during the training and post training conditions in comparison to baseline, providing evidence that the students were becoming more conversational by sharing information as well as initiating and asking follow-up questions. Further, when comparing total assertive acts to obligatory acts, the data show that during baseline, the students’ conversational acts were largely obligatory responses to peer questions. However, during training and post training conditions, the proportionately greater use of assertive acts indicated that all focal students were becoming more active, as opposed to passive or reluctant, conversationalists.

Table 5
Average and range of educator ratings of the quality of conversational interactions during baseline and post training conditions.

<table>
<thead>
<tr>
<th></th>
<th>Juan</th>
<th>Katia</th>
<th>Andres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>PT</td>
<td>B</td>
</tr>
<tr>
<td>Focal student interactions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. FS is actively engaged in conversation with peers</td>
<td>2.4 (2–4)</td>
<td>4.6 (4–5)</td>
<td>1.1 (1–2)</td>
</tr>
<tr>
<td>2. FS is responsive to peers questions or comments</td>
<td>3.6 (2–5)</td>
<td>5.0</td>
<td>1.6 (1–4)</td>
</tr>
<tr>
<td>3. FS leads conversation (asks questions, initiates)</td>
<td>2.8 (1–4)</td>
<td>4.3 (4–5)</td>
<td>2 (1–4)</td>
</tr>
<tr>
<td>4. FS shows interest in what peers are saying</td>
<td>2.6 (1–4)</td>
<td>4.4 (4–5)</td>
<td>1.4 (1–3)</td>
</tr>
<tr>
<td>Peer interactions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Peers attend to and draw the FS into conversation</td>
<td>4.1 (3–5)</td>
<td>5.0</td>
<td>2.8 (1–4)</td>
</tr>
<tr>
<td>6. Peers are responsive to the FS’s communication</td>
<td>3.8 (2–5)</td>
<td>5.0</td>
<td>2.1 (1–3)</td>
</tr>
<tr>
<td>7. Peers encourage sustained conversation</td>
<td>3.3 (2–5)</td>
<td>4.9 (4–5)</td>
<td>2.1 (1–4)</td>
</tr>
<tr>
<td>8. Peers show interest in what the FS is saying</td>
<td>3.8 (2–5)</td>
<td>5.0</td>
<td>2.4 (1–4)</td>
</tr>
<tr>
<td>Overall conversation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Conversation is relaxed and natural</td>
<td>3.6 (2–5)</td>
<td>4.9 (4–5)</td>
<td>2.6 (1–4)</td>
</tr>
<tr>
<td>10. Conversation is typical of same age peers</td>
<td>3.5 (2–5)</td>
<td>4.6 (4–5)</td>
<td>2.6 (1–4)</td>
</tr>
</tbody>
</table>

Note: B = baseline; PT = post training.
3.4. Social validity

3.4.1. Peers

Peers rated all 11 items on the acceptability survey positively. Peers judged items pertaining to the training they received, the effects of the peer-mediated intervention on improving the conversational skills of their partner, and the impact of the intervention on producing positive social outcomes for themselves and the focus student as strongly positive, with averages for each item exceeding 6.1 on a 7-point scale. Additionally, all peers indicated that they would most definitely recommend the peer-mediated intervention to a friend ($M = 7.0$). On the other hand, peers rated three items regarding the implementation of the PMI slightly less positive (e.g., ease of use ($M = 5.5$), understanding of the intervention ($M = 5.6$), and liking of the intervention ($M = 5.9$). In follow-up discussions, some peers commented that prompting was difficult to learn and felt awkward to use at times; however, they acknowledge the positive changes they observed in the focal students. For example, one of Katia’s peers said, “We would come into lunch, put our things down, and she would say, ‘Oh my gosh, I have something to tell you!’” Before (training) she was like, ‘Why are you here? Go away. Leave me alone.”

3.4.2. Focal students

During baseline, all focal students indicated that they were highly satisfied with their lunchtime conversations with their peers: Juan and Katia gave all six items a rating of 5.0 on the 5-point scale, while Andres rated each item as 4.0. At the end of post training, Juan’s positive ratings did not change and Katia did not complete the post training survey before she moved. Andres’ post training scores remained positive (scored 4 or 5 on items), but decreased to 2 (A little) for two items: “I enjoy having lunch with my friends” and “My friends enjoy having lunch with me.”

3.4.3. Educators’ ratings

Mean and range of educators’ ratings of the quality of focal student and peer conversational interactions are displayed in Table 5. All eight educators noted substantial improvements from baseline to post training on all items pertaining to the focal students’ and peers’ conversational behaviors, and the overall quality of the conversational interactions, indicating that post training conversations were more natural and typical of same age peers. With the exception of two items for Katia, all post training ratings averaged above 4.0 on a 5-point scale for focal student and peer behaviors, and the overall quality of the conversation.

4. Discussion

The effects of the PMI were evident in the focal students’ improved conversational abilities with their peers. First, results indicated that focal students exhibited higher rates of conversational acts and engaged in longer conversations as evidenced by the increased average number of conversational acts per episode. Second, the students showed improved ability to initiate conversations and ask follow-up questions to maintain or extend conversations. Third, the PMI led to collateral increases in the students’ use of comments, another topic maintenance skill, which when combined with increases in initiations and follow-up questions resulted in the students becoming more active, as opposed to passive or reluctant conversationalists. Finally, network peers and educators validated the impact of the intervention. Substantial changes in both focal student and peer behaviors were evident to naïve educators during brief video clips. Moreover, educators also found the conversations to be natural and typical of high school conversations, attesting to the overall quality of the interactions. In sum, these are impressive outcomes for these students who, prior to the study were socially isolated and rarely conversed with peers.

The focal students’ social validity ratings of their lunchtime conversations were also largely positive, but incomplete without Katia’s post-intervention survey. Andres’ lower post-intervention scores are consistent with his variable performance during the training and post training conditions. Although his conversations substantially improved over baseline, on some days he appeared anxious (i.e., acted silly, fidgeted with lunch materials) in response to his peers’ increased expectations for conversation. While his discomfort might have improved with more time in intervention, his performance suggests that modifications, such as incrementally increasing conversational demands across sessions, may be needed for students who are anxious when interacting with others.

This study contributes to the literature in several important ways. First, it adds to the small body of PMI research (e.g., Hochman et al., 2015; Hughes et al., 2013) conducted with adolescents with ASD in high school settings. Second, it builds upon PMI research focused specifically on enhancing the conversational skills of individuals with ASD. Like this study’s predecessors (e.g., Thiemann & Goldstein, 2004; Kamps, Mason et al., 2014), we used a multicomponent intervention consisting of peer training and written text cues, with some direct instruction for the focal students to target multiple student outcomes and maximize intervention effectiveness. Although disentangling the contribution of each intervention component is not possible, our design’s sequential introduction of the three training components permits us to generate several important implications for practice. First, as suggested by other studies (Feldman, Carter, Asmus, & Brock, 2015; Schmidt & Stichter, 2012), systematic intervention is necessary, as proximity to peers alone does not necessarily result in the social interaction. Unlike other PMI studies (e.g., Hochman et al., 2015; Hughes et al., 2013) where “business as usual” baseline observations reflect the natural isolation of focal students and peers in integrated school settings, we deliberately created opportunities for conversation by arranging for the participants to have lunch together. They understood their purpose of “hanging-out” and making friends. Yet, despite this arrangement, no change in the focal students’ conversational
abilities was evident even though the participants had lunch together for many weeks, as was especially the case for Katia and Andres. In fact, these extended opportunities for social interaction with no intervention made for very strained and awkward conversations. Peers reported during follow-up discussions that they were confused about what to do when the focal students only gave one word responses to their questions, turned or looked away, and did not ask questions. Peers perceived the focal students as either being overly shy or disinterested in talking with them, contributing to the lack of interaction. The second implication is that when improved conversation is the goal, PMI must include explicit strategies to teach specific conversational skills. Consistent with the findings of Thiemann and Goldstein (2004), teaching peers facilitative strategies to support conversation was helpful in increasing overall conversational acts, largely because the peers did the work of carrying the conversations, but did little to impact improvements in the focal students’ conversational skills. Increases in focal student initiations and follow-up questions occurred only after training for these skills was implemented, providing additional support for a multicomponent intervention (e.g., Kamps, Mason et al., 2014; Thiemann & Goldstein, 2004). Facilitative strategies are needed to promote responsive partnering and support conversational interaction, whereas explicit strategies (i.e., text cues coupled with peer training to prompt and create opportunities for conversational acts) are needed for increasing target skills.

For all focal students, some increases in follow-up questions occurred during T2 for promoting initiations. This seemed to occur because written questions on the students’ cue card intended for initiations, seemed to influence other question asking to maintain conversation once an episode began. For instance, Juan often repeated a version of the same question with the second peer to maintain interaction after the first peer responded to his initiation (e.g., “And you, how was your weekend?”).

A third major contribution to the literature is that the peers served as the primary interventionists. Most PMI studies focused on improving social-communication skills (see Watkins et al., 2015) employ an adult interventionist who is present in the targeted observation activity to prompt peer and/or focal student responses. In this study, all training occurred outside of the lunch activity, and peers implemented the intervention during lunch without adult facilitation. A key advantage for high school is that adults do not disturb the natural discourse of adolescents who might find adult presence stigmatizing. Additionally, training outside of natural social activities is a good fit for high school schedules and, once trained, peers have the potential to support social conversations with students with ASD during other interactions/activities throughout the day.

The peers in this study appeared to learn a relatively complex intervention, resulting in a complex set of skills by the focal students, in a relatively short period of time. Only five 30-min group training sessions plus 5 min of daily feedback during the training phase were needed to improve conversation. Although we cannot separate out the effects of the students’ use of their cue cards, fading peer training to weekly consultation meetings was sufficient to maintain student gains during the post-training phase. Importantly, all peers found the training to be acceptable, although they reported that prompting was not easy to learn and awkward to use at times. Additional attention is needed to modify the prompting strategies by simplifying the prompts (i.e., using a single prompt rather than a prompt hierarchy) and incorporating more natural expressions used by teens.

A fourth contribution is our use of a novel cue card with scripted text to prompt student initiations around age-appropriate topics of conversations. Capitalizing on the focal students’ reading abilities, the written text provided students with an efficient way to begin conversations (and perhaps lessen the need for frequent peer prompting) by either asking a question or making a statement. Unlike other studies (e.g., Ganz et al., 2012; Hughes et al., 2013) where scripted text prompts remained static throughout the intervention, the text prompts in this study changed daily and with instructor support were generated by the focal students. This novel extension of written text cues may have contributed to the naturalness of the focus students’ conversations and, as discussed previously, may have influenced increases in follow-up questions as well as commenting. Additionally, although we did not fade the cue card or decrease instructor support in helping students generate topic starters, our data also showed that the students generated a proportionately greater number of unscripted than scripted initiations during conversations with their peers, suggesting that cue cards may have helped to enhance spontaneity. Researchers should consider ways of fading the card in future replications.

Limitations of the study suggest additional recommendations for future research. First, there was considerable variability in the focal students’ response to the intervention, particularly with regard to the magnitude of the change for the primary outcome measures. Although many factors may account for this variability, including peer performance, differences in student characteristics appeared to be a primary contributor. For example, Juan had the highest number of follow-up questions compared to the other two students; however, both Katia and Andres used comments more to maintain conversation making for a more age-appropriate conversational style. Researchers should examine how student characteristics and pre-treatment conversational skills (e.g., Fey, 1986) influence their response to intervention.

Second, although we carefully monitored peer performance via videos, other than prompting, we did not measure the peers’ implementation of the intervention strategies. The lack of peer implementation measures is a limitation of PMI research in general (Chan et al., 2009) and should be addressed in future research. Third, our definition of an initiation and a conversational episode requires refinement. Initiations and the start and stop of a conversational episode was defined by time (i.e., 5-s latency) and not topic change, as often described in the language literature (e.g., Fey, 1986). As defined, the measures documented that the focal students started conversations and engaged in longer continuous reciprocal interactions; however they do not account for changes in topic. A true measure of topic maintenance would be reciprocal interaction around a single topic. Future researchers should consider addressing this.

Fourth, the challenges of developing and evaluating the intervention with the focal students who attended a segregated program, limited our ability to assess generalization in this study. Future replications should assess whether the
conversational gains made by students with ASD are generalized to other social settings and with novel peers. Finally, to enhance external validity, future replications should involve teachers as instructors. Although efforts were made to make the intervention feasible for high school settings, until school personnel carry out and evaluate the intervention, the practicality of the intervention remains unknown.

In summary, efforts to enhance the conversational abilities of adolescents with ASD are needed while they are still in school, not only to improve high school social relationships, but also to build the social competence needed for a successful and satisfying adult life. The outcomes of this study provides preliminary evidence that this PML can result in substantial and socially validated conversational outcomes for high school students with ASD.

Acknowledgements

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References


