

Research Article

Using Peer Supports to Encourage Adolescents With Autism Spectrum Disorder to Show Interest in Their Conversation Partners

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Purpose: This study was conducted to evaluate the effects of a multicomponent peer-mediated intervention (PMI) on teaching adolescents with autism spectrum disorder (ASD) how to show interest in peer conversation partners by asking partner-focused questions about the person, their interests, or their experiences and by making partner-focused comments that positively affirm peer statements or express concern.

Method: A multiple-baseline design across three verbally fluent high school students with ASD was used to assess the effects of the PMI, which involved training peers ($n = 10$) to support conversation and the students' use of target skills, and training the students to use partner-focused skills with the aid of a self-reflection cue sheet during conversation with trained peers in a high school cafeteria. Ten-minute samples of student-peer conversations were transcribed and analyzed. Generalization with untrained peers was assessed.

Results: The PMI was highly effective in increasing all students' use of partner-focused skills. Gains were maintained by two students in a return-to-baseline condition. Generalization was evident for all students with varied results. Peers and students with ASD perceived the intervention to be beneficial.

Conclusions: This study adds to the limited research showing that PMI can be used in high school settings to improve target conversational skills and provides preliminary evidence that PMI can successfully address an underresearched pragmatic language difficulty (i.e., introducing and maintaining topics of conversation of relevance and interest to conversation partners) common among adolescents with ASD. These findings invite replication to extend generality and assess the impact of the intervention on peer relationships.

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Although many verbally fluent adolescents with autism spectrum disorder (ASD) have language abilities within the normative range of functioning, they often display difficulties with pragmatics or the use of language during social situations (Paul et al., 2009). From middle school to high school, adolescents increasingly spend more time with their peers than with adults (Turkstra et al., 2003). Socially competent adolescents must be keenly aware of the social rules for peer interaction and conform to expectations by flexibly adapting and appropriately using social communication skills across varied circumstances, yet due to

core social communication limitations, adolescents with ASD may have difficulty successfully navigating social interactions (Usher et al., 2015). Difficulties with interpersonal communication can have a deleterious impact on social relationships. Adolescents with ASD often report a desire for friendships, yet they are also aware that their communication limitations can interfere, contributing to social isolation and feelings of loneliness (Cresswell et al., 2019).

Conversation is the primary medium for adolescent social interaction (Turkstra et al., 2003) and can be described as a complex skill set needed to initiate and maintain reciprocal and cohesive exchanges around shared topics of interest with conversation partners (Paul et al., 2009). Conversation is also context and partner specific (Sng et al., 2018). Research reveals that adolescent conversation with same-age peers differs substantially from adolescent conversation with adults (Turkstra, 2000; Turkstra et al., 2003). Thus, understanding how adolescents use conversational skills to establish

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meaningful peer connections is especially important for targeting relevant intervention goals. Toward this end, three studies (Henry et al., 1995; Reed et al., 1999; Reed & Trumbo, 2020) explored the perceptions of adolescents regarding the relative importance of 14 different conversational behaviors to form peer relationships. Across these studies, communication behaviors characterized as partner focused and empathetic were ranked as most important by the adolescents and included the ability of friends to understand their point of view, be sensitive to how they are feeling, talk about things that are of interest to them and that are appropriate to the situation, and listen without interruptions. These findings highlight the importance of adolescents' sensitivity to their conversation partners, showing interest in what they have to say and being responsive to their partner's feelings, thoughts, and opinions. By contrast, the findings of other research suggest that a self-focused orientation, defined as the tendency to direct conversation toward one's own interests or concerns, may damage adolescent relationships (Schwartz-Mette & Rose, 2009).

Specific conversational skills used by adolescents to show interest in and sensitivity to their peer partners have not been well explored and defined by research. Turkstra et al. (2003) observed that some of the more frequent skills used by adolescents in peer conversations included asking and answering questions, giving contingent responses related to their partner's prior utterances, taking equivalent turns (e.g., being careful not to dominate conversation), and using nonverbal expressions and verbal interjections to signal agreement and empathy to what their partners have said. However, partner-focused (PF) skills often elude adolescents with ASD. The conversational style of verbally fluent adolescents with ASD often has been characterized as overly verbose, where individuals may talk continuously about a favorite topic without regard to their conversation partner's interests, engagement, or attempts at introducing new topics of conversation (Klin & Volkmar, 2003; Peters & Thompson, 2015). Usher et al. (2015) found that children and adolescents with ASD displayed lower levels of social reciprocity, including turn-taking and seeking information about their peer partners, and higher levels of initiatives (e.g., initiating topics and sharing information) in conversation compared to same-age peers without an ASD diagnosis. These findings support the supposition that some individuals with ASD tend to show a higher propensity for sharing information about themselves or their self-interests than seeking information about their conversation partners (Usher et al., 2015).

Although not always more verbose than same-age peers, other researchers have found that children and adolescents with ASD have difficulties contextually relating their responses to their conversation partner's prior utterances, an underlying skill needed to convey partner sensitivity (Adams et al., 2002; Tager-Flusberg & Anderson, 1991). Nadig et al. (2010) observed that when children with ASD talked about their intense interests, as opposed to a more neutral topic, they gave fewer partner-related or contingent responses, creating a more one-sided conversation.

Finally, difficulties with expressing empathy can also impede a PF orientation. Many studies reveal that children and adolescents with ASD often struggle with recognizing the emotions of others, sharing emotional states, and engaging in perspective taking (van der Zee & Derksen, 2020), all of which are needed to show concern for others during conversation.

The failure of some adolescents with ASD to show interest in and sensitivity to their conversation partners may be explained by several theories. First, individuals with ASD may have difficulty recognizing relevant contextual cues that signal the need to adjust language to their partners' communications (Fletcher-Watson et al., 2013; Paul et al., 2009). Second, individuals with ASD may experience difficulties with ascribing and understanding the mental states of themselves and others (i.e., theory of mind), which, during social conversation, may impact their ability to see things from the perspectives of others, relate to others' emotions, and talk about others' interests (Chin & Bernard-Optiz, 2000). Third, the intense interests of some individuals with ASD may create a stronger motivation to talk about topics of self-interest, rather than the interests of others, impacting their ability to engage in balanced PF communications (Kuntz et al., 2020; Nadig et al., 2010).

Few studies have attempted to teach individuals with ASD PF conversation skills. Koegel et al. (2015) used a video feedback intervention combined with a graphic that illustrated response options to teach three young adults with ASD to express empathy during social conversations. Training involved teaching the adults to listen for statements of emotion made by a conversation partner and then respond contingently by making an empathetic statement or asking an empathetic question. The participants increased use of these skills during conversations with a clinician and in 1-month follow-up probes with a novel peer in a natural setting. Peters and Thompson (2015) taught children with ASD how to adjust their conversation when a partner appeared uninterested. The children were taught through modeling, practice, and feedback to recognize cues of partner disinterest and then change topics or ask questions to re-engage their partner. Positive effects were found in role-play conversations with the researchers, but no assessments were completed with natural peer partners.

Davis et al. (2010) taught high school students with ASD to use a scripted "Power Card" to focus on peer interests during conversation. The Power Card cued students to greet their partner, ask about their interest, ask a follow-up question while listening for a key word, then comment using the key word. The intervention increased the percentage of time the students were engaged in "other" focused conversation with a peer partner in an instructional setting; generalization probes with a new peer in general education classroom revealed mixed results.

Overall, these studies (Davis et al., 2010; Koegel et al., 2015; Peters & Thompson, 2015) document the effectiveness of direct instruction for teaching PF conversation skills; however, inclusion of peers during intervention and assessment of peer-to-peer conversation in natural, noninstructional settings

were limited. Involving peer partners in conversational skill training is important. Peer-to-peer conversation creates an authentic learning context that cannot be fully replicated in an instructional setting with an adult (Turkstra, 2000). Peer-mediated intervention (PMI), an approach that trains pro-social peers to support individuals with ASD in acquiring new social skills, provides an effective option. Much research has shown that PMI can improve range of social outcomes for children and adolescents with ASD using various intervention approaches (Steinbrenner et al., 2020). When improving communication is the goal, PMIs have commonly used a multicomponent direct instruction approach that combines training for both peers and learners with ASD along with visual supports to cue target skills, resulting in the acquisition and generalization of skills in natural school settings (e.g., Kamps, Mason, et al., 2014; Kamps, Thiemann-Bourque, et al., 2014; Mason et al., 2014).

Most PMI studies have been conducted with younger children; however, a growing body of research has shown PMI can be highly effective in teaching conversational skills to adolescents with ASD in high school settings. In two studies, Bambara et al. (2016, 2018) used a direct instruction approach to increase the assertive conversational skills of passive adolescent communicators. Training occurred in an instructional context outside the natural setting to teach adolescents with ASD how to use text cues to initiate topics and ask follow-up questions to extend conversation. Peers were trained to be responsive conversational partners, create opportunities for the adolescents to initiate and ask follow-up questions, and prompt the two target skills if needed. Posttraining observations of the trained peers and adolescents during conversations in the high school cafeteria revealed substantial improvements in the adolescents' ability to spontaneously initiate, ask follow-up questions, participate in more conversation, and engage in longer on-topic conversations. Probes conducted in Bambara et al. (2018) showed the students generalized these gains with novel peers on most measures. Thomas and Bambara (2020) evaluated a similar PMI approach for improving the conversation of high school students with ASD who engaged in high rates of inappropriate conversation acts (e.g., perseveration and scripting). The students were taught to use a cue card depicting various conversation topics to appropriately initiate and extend topics of conversation, and peers were trained to support on-topic conversations and redirect inappropriate conversation acts if needed. Observations of the social conversation of the trained peers and students in the high school cafeteria showed that the PMI was highly effective in reducing the number of inappropriate communication acts made by all students and resulted in generalization to untrained peers.

This study sought to extend PMI research by teaching adolescents with ASD how to show interest in peer conversation partners by asking PF questions about the person, their interests, or their experiences and by making PF comments that positively affirm peer statements or express concern. The multicomponent PMI involved training peers to support conversation and the adolescents' target skills and training the adolescents to use PF skills during social peer

conversations in a natural high school setting with the aid of a self-reflection cue sheet reviewed before and after conversations. We addressed the following questions: (a) Will the intervention produce increases in the adolescents' use of PF skills during social peer conversations? (b) Will increases in PF skills maintain and generalize to untrained novel conversation partners? (c) Will the peers and adolescent participants find the intervention procedures acceptable and the outcomes beneficial and meaningful?

Method

Participants: Students With ASD and Peer Partners

Three high school students with ASD participated. Each met the following inclusion criteria: (a) be enrolled in high school, (b) have a clinical or educational determination of ASD without an intellectual disability (i.e., IQ > 70), (c) communicate verbally and fluently in complete sentences across a range of communicative functions, (d) demonstrate low rates of the PF target skills in comparison to neurotypical peers, and (e) express a willingness to participate after receiving information about the goals and procedures of the intervention. To select participants, we asked teachers to nominate students with ASD who met our selection criteria, which we then verified by conducting record reviews and observations of the nominees across multiple school settings while they interacted with peers and adults. In addition, we collected, transcribed, and coded four 10-min language samples of the nominated participants in conversation to assess their use of the target PF skills relative to their peer partners and their language abilities. Table 1 provides information on the participants and the severity of autism symptoms. Juan and Nicolas attended a self-contained autistic support program, and Stephan, in his last year of high school, attended a self-contained life skills program, with each student spending about 20% of the school day in inclusive high school activities. All students identified as Hispanic. Juan spoke both English and Spanish; Stephan and Nicolas spoke English only. None of the participants received English language support or speech-language services in their high school at the time of the study.

Juan, 16 years of age, was a friendly student, well-liked by his teachers and classmates. Prior to the study, Juan regularly sat with a group of classmates during lunch. Although attentive to group conversations, he rarely initiated interactions and often responded to his classmates' initiatives with single-word utterances or short phrases. Despite his capabilities, he was seldom observed to ask questions about or comment on his classmate's experiences or statements.

Stephan, 20 years of age, regularly sat with two classmates during lunch. His participation in social conversation varied; on some days, he appeared sullen and unapproachable, turning away from his classmates or placing his head on the table. When engaged in conversation, Stephan appropriately initiated and was responsive to his partner's questions and

Table 1. Participant characteristics.

Student	Age/grade	Diagnosis	Ethnicity	IQ ^a	CARS-2-HF ^b /SRS-2 ^c
Juan	16/10th	PDD-NOS ^d	Hispanic	72 (KABC-II)	25.5 (minimal)/63 (mild)
Stephan	20/12th	PDD-NOS ^d	Hispanic	71 (SB-5)	39.5 (severe)/76 (severe)
Nicolas	16/10th	Autism	Hispanic	80 (WISC-IV)	28.5 (moderate)/66 (moderate)

^aKABC-II = Kaufman Assessment Battery for Children—Second Edition; SB-5 = Stanford–Binet Intelligence Scales—Fifth Edition; WISC-IV = Wechsler Intelligence Scale for Children—Fourth Edition. ^bCARS-2-HF = Childhood Autism Rating Scale—Second Edition—High Functioning. Raw score: 15–27.5 = minimal-to-no symptoms, 28–33.5 = mild-to-moderate symptoms, > 34 = severe symptoms. ^cSRS-2 = Social Responsiveness Scale—Second Edition. T score: < 59 = within normal limits, 60–65 = mild, 66–75 = moderate, > 76 = severe. ^dPDD-NOS = Pervasive developmental disorder—not otherwise specified.

statements but tended to direct conversation toward his self-interests. He often dominated conversations by oversharing details about his personal experiences or troubling events and not pausing to allow his partners to speak. He rarely asked questions about his conversation partners or their interests. According to school records, Stephan had difficulty coping with real or perceived teasing from his peers.

Nicolas, 16 years of age, routinely sat with a group of classmates during lunch. School records indicated that he had difficulty appropriately regulating his emotions, and he sometimes interacted inappropriately (e.g., throwing food). During conversations with his peer partners, Nicolas initiated, asked questions, responded to peer questions, and elaborated on topics extending conversation, but often only around preferred topics. He tended to engage in long monologues about his interests without allowing his partners to interject their comments on the subject. He rarely asked questions about or commented on his conversation partners or their interests.

Ten neurotypical peers, 15–18 years of age, served as peer partners trained to support the conversational skills of the focus students with ASD. The peers were organized into peer networks, one network for each student (Juan, three peers; Stephan, three peers; Nicolas, four peers). The network peers consisted of four boys and six girls (two White, one Black, six Hispanic, and one Asian). Six additional peers, 14–18 years of age, participated as untrained generalization partners (four boys and two girls; two Black and four Hispanic). We recruited peers via school announcements and teacher nominations. Interested peers attended an introductory meeting that described the purpose of the intervention (i.e., to support fellow students in improving their conversation skills) and the roles and responsibilities of network and generalization peer partners. The selected peers had to be available during the same lunch period as the focus student and express a willingness to participate as either a network or generalization peer partner. Peers had no prior relationship with the students. Students with ASD and peers provided written assent and parent consent to participate in this study approved by our university's institutional review board.

Settings and Instructors

All participants attended the same midsize (2,700 students) diverse urban high school in Northeastern United

States. Observations of the students' conversations with their peers took place in the high school cafeteria during their regularly scheduled 30-min lunch period. Each student sat with two peer partners at a table during lunch; no additional activity was introduced. Network and generalization peers rotated in pairs across sessions, depending on their availability. Training sessions for the peer networks and individual focus students were conducted separately in empty classrooms on days when observations did not occur. Instructors were two special education doctoral students who were trained prior to the start of the study by the first author in the instructional procedures through didactic instruction, observation, and feedback.

Dependent Measures and Data Collection Procedure

Our primary aim was to improve the focus students' skills for showing interest in their conversation partners by increasing the number of PF questions and comments made during social conversations with their peers. We defined a *PF question* as an utterance (in question or statement form) that sought information about the partner and the partner's experiences, preferences, beliefs, or feelings or inquired more about a topic related to the partner's immediate prior utterances. We defined a *PF comment* as a statement that positively affirmed or acknowledged what a partner had said, expressed empathy, offered advice or encouragement, or expressed a positive observation about the person or the person's experience.

To collect data, we obtained a 10-min continuous sample of the conversation between the students and their peer partners on each observation session. We recorded each session for later coding using a small digital voice recorder (observers were not present in the cafeteria). The sample began with the first student-to-peer or peer-to-student initiation after the participants greeted one another. Observers transcribed all conversational utterances made by the students and their peers line by line on an Excel spreadsheet formatted to calculate the frequency of all codes. We used communication units (C-units) to segment lengthy utterances around independent clauses following the C-Unit Segmentation Rules (2019) provided by Systematic Analysis of Language Transcripts software.

Once a sample was transcribed, observers coded each student and peer utterance as an initiation, response, or other. An *initiation* introduced a new topic unrelated to a partner's or one's own immediate prior utterance. A *response* was any utterance that followed an initiation that was related to a partner's or one's own prior utterance or topic under discussion. Utterances coded as initiations or responses extended conversation by introducing or adding new information. To avoid overinflating the data, utterances that maintained conversation but added no new information were coded as *other* with few exceptions. Initiations and responses were then further coded as a PF question, a

PF comment, or a non-PF utterance. See Table 2 for all code definitions and examples.

We also compared the students' use of the target skills with that of their peer partners. Because each observation involved two peers, we compared the students' frequency with the average number of PF skills displayed by their peers in each session.

Observer Training and Interobserver Agreement

Three doctoral level graduate students in special education or school psychology served as observers. Prior to

Table 2. Code definitions and examples.

Code	Definition	Examples
Initiation (I)	An utterance that introduces a new topic of conversation that is completely unrelated to a partner's or one's own preceding verbalizations or the concurrent topic of conversation.	(Peers discuss football game.) FS: So, what are you doing this weekend? (I)
Response (R)	An utterance that is related to what a conversation partner has just said, one's own immediate prior verbalizations, or the concurrent topic of conversation. Responses extend the topic of conversation by adding information and include topic shifts that introduce a new subtopic but can be linked back or is related to the prior topic.	FS: What did you do over the weekend? P: I went to Philadelphia. (R) FS: Did you do anything specific? P: I went to my cousin's wedding. (R)
Other (OT)	An utterance that maintains but does not add additional information to the topic of conversation including (a) "yes/no" and "I don't know" responses to questions, (b) requests for repetition or clarification, (c) repetitions, (d) one-word acknowledgements or agreements (e.g., "yeah," "right"), and (e) functional statements related to lunch or the procedures of the study.	FS: What did you do this weekend? P: What? (OT) FS: Did you do anything this weekend? (OT)
Partner-focused question (PFQ)	An utterance (in a question or statement form) that seeks information about the partner and partner's experiences, preferences, beliefs, or feelings or asks more information about a topic related to the partner's immediate prior utterances.	P: I went to NY yesterday. FS: Oh, what is it like in NY? (PFQ) P: This weekend I have to redecorate my room and I have to work on this project. FS: Cool, what's the project about? (PFQ)
Partner-focused comment (PFC)	A statement that positively affirms or acknowledges what a partner has said, expresses empathy, offers advice or encouragement, or expresses a positive observation about the person or the person's experience. "Cool," "wow," "oh boy," and "same" (typical teen expressions) were coded PFC provided that they positively acknowledged what a partner has said or expressed empathy.	P: I watch a lot of TV too, a lot of science fiction and mystery. FS: That's really interesting. (PFC) FS: Are you guys ready for the test? P: No, I feel like I might forget like the small details. FS: I'm sure you'll do great. (PFC) P: I gotta take the SATs this weekend. FS: That can be stressful. (PFC) FS: Did you get that bracelet at the mall? P: Yeah, I did. FS: It looks so nice! (PFC)
Non-partner focused (NPF)	Any question or comment that does not meet the definition of partner focused. NPF utterances often center around the speaker's interests, experiences, preferences, opinions/beliefs, actions, or feelings and typically include "I," "me," "mine," "I think," etc., but can also include utterances that are nonaffirming or oppositional. Rhetorical or lead-in questions ("Guess what I did over the weekend") that does not seek information from the partner were coded as NPF.	P: I have so much homework tonight. FS: I have to study for three tests and write a 20-page paper. (NPF) P: I'm worried about the state exams tomorrow. FS: I'm not. (NPF)

Note. P = peer partner; FS = focus student; NY = New York.

data collection, observers were required to achieve a criterion of 80% agreement on the transcription and coding of two consecutive previously recorded samples. Observers listened to the recording as often as necessary to ensure accuracy.

We assessed interobserver agreement (IOA) on a minimum of 31% (range: 31.7%–35.7%) of the observations for each focus student. Assessments were randomly selected and balanced across phases. To determine IOA, two observers independently transcribed and coded the same 10-min sample. IOA was first conducted to establish overall transcript reliability, calculating the percentage agreement on codable utterances made by the students and their peers. Comparing the two transcripts side by side, an agreement was noted when both observers transcribed the same segmented utterance in the same sequence; slight wording variations were acceptable (e.g., “That was cool!” vs. “That was really cool”). A disagreement was noted when an observer transcribed an utterance that the other did not due to an omission or segmentation error. Mean agreement on codable utterances was 95.0% (range: 79.8%–100%) across students and 95.9% (range: 83.1%–100%) across network and generalization peers.

Next, IOA was calculated on each code for the students and their peers by matching the agreed-upon utterances between the two observers. Comparisons were made utterance by utterance and code by code. An agreement was noted when both observers recorded identical codes for the same utterance, and a disagreement was noted when one observer coded something different from the other. Mean agreement and range for focus students were as follows: initiations, 99.5% (83.3%–100%); responses, 98.5% (94.7%–100%); other, 93.1% (75.0%–100%); PF questions, 99.4% (88.9%–100%); PF comments, 99.0% (90.9%–100%); and non-PF utterances, 99.2% (88.0%–100%). Mean agreement and range for network and generalization peers were as follows: initiations, 99.7% (87.5%–100%); responses, 98.5% (93.7%–100%); other, 94.9% (85.2%–100%); PF questions, 97.5% (83.3%–100%); PF comments, 92.2% (81.8%–100%); and non-PF utterances, 97.8% (89.8%–100%).

Experimental Design and Data Analysis

We used a multiple-baseline design across participants to sequentially evaluate the effects of the multicomponent PMI on increasing the students' use of PF conversation skills. Observations occurred 3–4 times per week when the student with ASD was not in training. School events, school closures, and student and peer absences caused some variation in the frequency of weekly observations and some missing data points for individual students. Experimental conditions were (a) prebaseline peer training, (b) baseline, (c) student training, (d) intervention, (e) maintenance, and (f) generalization with untrained peers. We made phase change decisions based on the students' overall use of PF skills (questions and comments combined), although we also graphed and calculated means for each individual skill for additional analyses. We used visual analysis considering level, trend, variability, overlap, and immediacy

of effect to inspect changes across conditions and consistency across cases to determine functional relations. To supplement visual inspection of the intervention effects, we generated Tau-U (Parker et al., 2011), a nonparametric effect size index, with *p* values and 90% confidence intervals (CIs) using a web-based calculator (Vannest et al., 2016). Ranging from 0 to 1, the effect size can be interpreted as small (.20 or lower), moderate (.20–.60), large (.60–.80), and very large (.80–1; Vannest & Ninci, 2015).

Prebaseline Peer Training

Prior to data collection, instructors trained network peers to support conversation and create opportunities for the students to ask PF questions and make PF comments. Our rationale for introducing peer training prior to baseline was to ensure that peers provided consistent opportunities for the students to demonstrate use of the target skills in conversation across experimental conditions.

Following a scripted protocol, instructors led three 25-min didactic training sessions with each peer network. In the first session, the instructor described the role of peer network partners (i.e., to be good conversational partners to assist the student in learning and practicing new conversation skills), the goal of the intervention (i.e., to help the student to show interest in others), and the procedures and expectations for peer participation. The instructor also led a discussion on the characteristics of a good conversation partner. In Session 2, the instructor introduced peers to a worksheet that described four strategies on how to be a supportive partner. She described the first three strategies, giving a rationale and examples for each: (a) include the student in the conversation (i.e., find mutual interests so that everyone can participate, show interest, and be responsive), (b) give the student time to talk and respond (i.e., wait before jumping in and one person talks at a time), and (c) keep the conversation going on a topic for as long as there is interest (e.g., share related information and ask questions). Peers then practiced these strategies in role-play conversation with the instructor. In Session 3, the instructor introduced and gave examples of the fourth strategy: make leading statements about yourself—your interests, opinions, experiences, or feelings. She explained that leading statements share information about oneself, but not too much, so that the student can ask more or say something positive or empathetic about what was said (e.g., “I have a big math test tomorrow, guess I’ll be up all night studying.”). After discussing examples, the peers practiced making leading statements, along with the other three strategies in role play with the instructor.

Following training, the instructor gave network peers a 2 × 3 in. cue card listing the four strategies and directed them to use the strategies with the goal of making approximately five leading statements each or 10 total statements between them during prebaseline lunch conversations with the student. Peers were encouraged to make leading statements whenever it felt natural during the course of the conversation and on any topic of interest. The instructor listened to the audio recordings of each prebaseline conversation,

used a fidelity rating scale to evaluate the peers' use of the strategies, and provided feedback to the peer network in the cafeteria immediately before the next session. Feedback continued until each pair within a network met the criterion for implementation for two sessions (see fidelity).

Baseline

Following peer training, network peers (two a time) and the focus students were encouraged to continue having lunch conversations as they would with any of their friends. Immediately prior to each session, the instructor reminded the peers to use the conversational support strategies summarized on their cue card. Once the peers and the student sat down at the lunch table, there was no further instructor interaction or directions given to the group.

Student Training on Showing Interest

Following a predictable pattern of PF responses during baseline, each student participated in five 25-min training sessions. The target skills for showing interest were illustrated on a graphic that the instructor made available for reference as the student was introduced to and practiced using each skill during training (see Supplemental Material S1). The instructor explained that the skills for showing interest in a conversation partner are helpful when meeting new people, now and later in adult life, and for establishing and maintaining friendships.

Using a scripted protocol, the instructor implemented the first three sessions following the same sequence of instruction: (a) provide a rationale and review all skills on the graphic, (b) introduce/explain use of a new skill, (c) give examples of the new skill and have the student generate examples on a worksheet, (d) model use of the skill in a conversation, (e) have the student role-play use of the skill in conversation with the instructor, and (f) have the student role-play the new skill combined with the skill(s) practiced in the previous sessions. In Session 1, the student was taught how to initiate a conversation by asking about his partners using a PF generic question (e.g., "How was your weekend?") or a specific question about his peers' interests or experiences shared in previous conversations (e.g., "How's job hunting going?"). In Session 2, the student was taught to ask PF follow-up questions. Pointing to the graphic, the instructor guided the student to "listen to what your friends are saying and ask more about it. You can ask more about their experiences (e.g., 'What's New York like?'), their thoughts or opinions ('What did you think about the movie?'), or their feelings ('Were you nervous?')." Session 3 focused on making positive PF comments related to the peers' shared experiences, perspectives, or feelings. The instructor again guided the student to "listen to what your friends are saying and then say something positive or affirming (e.g., 'That's so cool!'), encouraging or advice giving (e.g., 'Keep working at it'), or empathic (e.g., 'That's terrible') to show interest."

In Sessions 4 and 5, the student practiced combining all skills (PF questions to initiate and follow-up and PF comments) in two continuous 5-min role-play conversations with the instructor. During role play, the instructor pointed

to the graphic to make suggestions for what skill to use if the student failed to respond to natural conversation cues. Prior to and after each role play, the student reviewed a self-reflection cue sheet to be reminded of the skills to show interest and self-evaluate by giving examples of how he used the skills in conversation with guidance and feedback from the instructor (see Supplemental Material S2). The student needed to demonstrate at least five unprompted PF skills in each role play before moving to the next phase. Students were encouraged to use the skills flexibly following topics of interest and the interests of their peer partners.

Intervention

After training on showing interest, the student was encouraged to use PF skills in lunchtime conversations with his trained network peers. Immediately before each session, the student met with the instructor in the cafeteria to review the target skills on the self-reflection cue sheet. As in baseline, there was no further adult interaction once the student and his peers sat at the lunch table. Immediately after lunch, the instructor guided the student to review the cue sheet to give examples of how he used the skills during peer conversation and write two potential questions on the sheet to start a conversation for the next interaction based on his peers' interests or experiences. The questions were reviewed prior to the start of the next session.

After 7–9 intervention data points showing an improved and predictable pattern of responses and starting on a Monday session, the instructor began to fade her support while encouraging the student to use the self-reflection cue sheet independently. The instructor first eliminated her after-lunch review with the student and then continued to decrease assistance across three or four sessions until the student was reading the checklist silently and generating conversation starters independently.

Maintenance

Once the instructor faded her support, we assessed maintenance by returning to baseline conditions. The instructor continued to remind the peers to use the conversation support strategies summarized on their cue card and, during the first maintenance session, reminded the student to continue to use PF skills to show interest in his peers without further instruction and review of the self-reflection cue sheet. Beginning on Session 26, we decreased maintenance observations for Juan to twice per week.

Generalization Probes

We assessed generalization with untrained peers who were naïve to the intervention goals and procedures by arranging two peers at a time to have lunch with the student. Probes were conducted 3 times 1–3 weeks before baseline and 3 times 1–3 weeks after the last phase. The student and his peers were encouraged to converse as they would with any friend. During the second set of probes, the student was reminded to use his PF skills with no further instruction.

Modifications for Stephan

Two procedural modifications were made for Stephan. First, following nine intervention sessions and five consecutive days of student absences, Stephan was given two additional training sessions due to a sharp decrease in PF skills. The instructor followed the same procedures as in Sessions 4 and 5 of student training, while emphasizing the importance of listening to and responding to peer interests during conversation. A second modification was made following the fifth session of instructor fading due to a steady decline in PF skills. Stephan indicated that he had difficulty coming up with PF questions to start conversations without help. The instructor reverted to the procedures used in the second day of fading by coaching Stephan to give examples of the PF skills after he read the self-reflection cue sheet before lunch.

Fidelity

Observers assessed training fidelity on the core instructional components of peer and student training using a checklist that mirrored the instructor's protocol on 100% of the training sessions. Fidelity was 100%. Fidelity on the instructor's adherence to procedures (e.g., use of materials and directions) in the observation setting was taken an average of 61.9% of the observations for all students and distributed across all phases. Procedural fidelity was also 100%. Observers also assessed fidelity on network peers' use of strategies on every session using a rating scale. An observer listened to a recorded conversation, noted the presence or absence of each of the three support strategies (i.e., include the student in conversation, give the student time to respond, and keep the conversation going) at the end of 1-min intervals, and tallied the number of leading statements made by the peers throughout the session. The observer then rated each strategy using the scale 0 = *not observed*, 1 = *sometimes observed* (i.e., fewer than six instances), 2 = *frequently observed* (i.e., seven to nine instances), and 3 = *always observed* (i.e., 10 or more instances), resulting in an overall maximum score of 12. Mean fidelity across network peers was 11.31 (range: 7–12). The instructors used the ratings to monitor peer performance across all observations, providing corrective feedback to network peers prior to the next session if they fell below criterion (i.e., overall score of 10 with no individual item scoring 1 or 0). Each peer network received feedback several times (< 12% of the sessions, range: 3–5) across experimental conditions.

Social Validity

At the end of the study, network peers and focus students completed a questionnaire adapted from the School Intervention Rating Form (SIRF; Harrison et al., 2016). The survey, 10 items for peers and nine items for students, asked the participants to rate the acceptability and perceived benefits of the intervention on a 7-point Likert-type scale (i.e., 1 = *strongly disagree*, 4 = *neutral*, 7 = *strongly agree*). Additionally, network peers were asked about how often the student

used the target skills and showed interest in them by completing a four-item survey at the end of baseline, intervention, and maintenance. Peers rated items on a 5-point Likert-type scale (i.e., 1 = *not at all*, 3 = *so-so*, 5 = *a lot*) and were encouraged to share their observations about their conversations with the student in a write-in section.

Results

PF Skills Combined

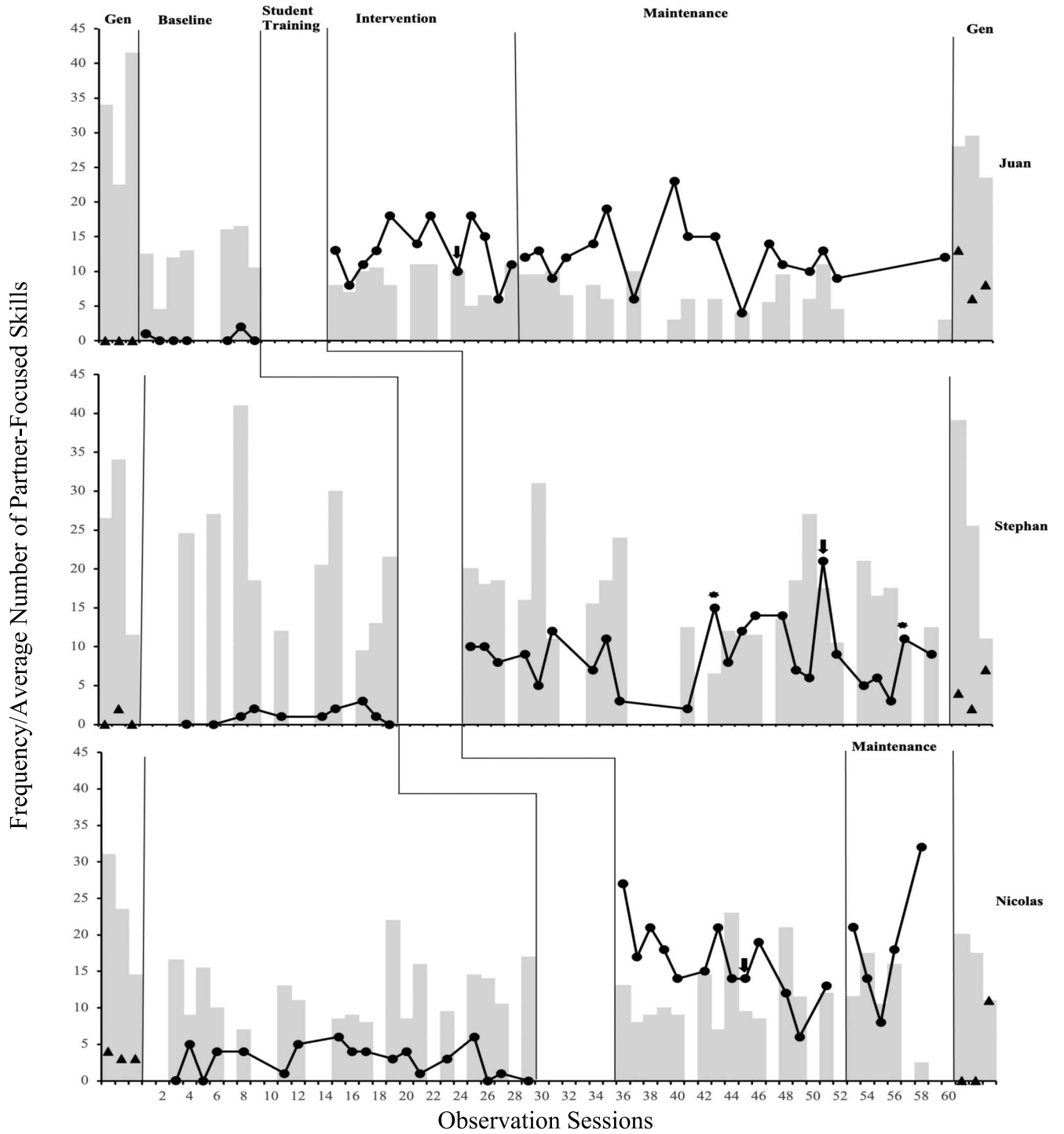
Figure 1 shows the frequency of the two PF skills combined (primary dependent variable) for each student and the average number of PF skills displayed by the two peer conversation partners on each observation. The data demonstrate a functional relation between the multicomponent PMI and an increased number of PF skills used by the students in social conversation. Across students, baseline trends were stable or descending. Despite the opportunity to use PF skills during baseline and relatively high use of these skills by their peer partners, Juan ($M = 0.4$, range: 0–2) and Stephan ($M = 1.1$, range: 0–3) rarely used PF skills in conversation. Nicolas displayed higher levels and more variable use of PF skills ($M = 2.8$, range: 0–6), but at levels consistently lower than his peers.

Following student training, the introduction of the intervention corresponded with an immediate increase in PF skills for all students. Juan's data showed an immediate change in level improving to an average of 12.9 (range: 6–18) with no data points overlapping with baseline and a slight decrease in skills as the instructor faded her support. Juan's PF skills exceeded his peers' average use in most sessions. Stephan's data showed an immediate change in level at the onset of intervention, but after eight sessions, his skills decreased on Sessions 36 and 41—the latter session overlapping with baseline. Following retraining, Stephan's PF skills immediately increased and stabilized well above baseline but declined as the instructor faded her support. Once instructor support increased on Session 51, Stephan's PF skills increased. Overall, Stephan's skills improved to an average of 8.8 (range: 2–21) but was typically lower than his peers' average use. Nicolas also showed an immediate change in level improving to an average of 16.2 (range: 6–27). His PF skills decreased as the instructor faded support, with one session overlapping with baseline. For most sessions, Nicolas' PF skills exceeded or were comparable to his peers.

Juan and Nicolas progressed to maintenance. Juan's PF skills were more variable (range: 4–23) in maintenance than during intervention, but he maintained improvement across 17 observations (8 weeks) with an average of 12.4. Skill use generally continued to exceed his peers' use of skills. Nicolas also showed greater variability in maintenance (range: 8–32) than during intervention, but he maintained improvements with an average of 18.3, slightly above intervention. Nicolas' use of PF skills exceeded or was comparable to his peers' use of skills.

During baseline generalization probes, all students used few or no PF skills (Juan, $M = 0$; Stephan, $M = 0.66$, range: 0–2; Nicolas, $M = 3.3$, range: 3–4), whereas their

Figure 1. Frequency of partner-focused skills combined (closed circles). Closed triangles indicate generalization probes. Bar graph indicates peer average. Arrow indicates the onset of instructor fading. *Indicates modifications for Stephan.



peers used high rates in social conversation. During post-intervention generalization probes, all students showed some improvement over baseline probes. Juan achieved the greatest gains ($M = 9$, range: 6–13), followed by Stephan ($M = 4.33$, range: 2–7) and Nicolas ($M = 3.6$, range: 0–11). The peers' use of PF skills was consistently higher than the students' during post-intervention generalization probes, except for Nicolas' last post-intervention probe.

Tau-U, calculated to supplement visual inspection, indicated a very large intervention effect on the combined PF skills for all students: Juan, 1 (90% CI [0.54, 1], $p < .001$); Stephan, 0.98 (CI [0.61, 1], $p < .001$); and Nicolas, 0.99 (CI [0.64, 1], $p < .001$).

Additional Analyses

We conducted additional analyses to evaluate the effects of the multicomponent PMI on the students' use of each PF skill. With regard to PF questions (see Figure 2), all students showed an immediate change in level from baseline to intervention. Juan and Nicolas frequently asked more PF questions than their peers across intervention and maintenance sessions, whereas Stephan's use of questions during intervention was variable with more overlap with his peers. Post-intervention generalization probes showed that both Juan and Stephan increased their use of PF questions over baseline probes, but at levels less than their peer partners. Nicolas showed an increase only on the last generalization probe at a level comparable to his peers. Tau-U calculations for PF questions revealed a very large intervention effect for all students: Juan, 1 (90% CI [0.54, 1], $p < .001$); Stephan, 0.98 (CI [0.62, 1], $p < .001$); and Nicolas, 1 (CI [0.65, 1], $p < .001$).

The students' use of PF comments (see Figure 3) was also impacted by the intervention as evidenced by an immediate change in level for all students; however, commenting occurred less frequently than questions and was highly variable. Juan and Nicolas commented about as frequently as their peers, whereas Stephan's PF comments typically occurred less frequently than his peers. Juan and Nicolas maintained their use of PF comments once instructor support was withdrawn, with continued variability and at levels comparable to network peers. Only Juan showed an increase in the use of comments during post-intervention generalization probes than during baseline probes, but at frequencies less than his peers. Consistent with visual inspection, Tau-U intervention effect sizes were moderate to large across students: Juan, 0.87 (90% CI [0.41, 1], $p < .001$); Stephan, 0.47 (CI [0.11, .83], $p < .001$); and Nicolas, 0.69 (CI [0.34, 1], $p < .001$).

Consistent with training, further analyses revealed improvements in the students' use of PF questions to initiate conversation. During baseline, Juan never initiated with a PF question, whereas Stephan ($M = 0.1$, range: 0–1) and Nicolas ($M = 0.1$, range: 0–1) rarely used a PF question to initiate. Increases occurred for Juan ($M = 1.8$, range: 0–4), Stephan ($M = 1.8$, range: 0–4), and Nicolas ($M = 2.5$, range: 0–5) during intervention and continued in maintenance for Juan ($M = 2.7$, range: 1–5) and Nicolas ($M = 2$, range: 1–5).

Only Juan used PF questions to initiate in postgeneralization probes. For a complete breakdown of all initiation and response means for PF skills and other coded utterances, see Supplemental Material S3.

SIRF Ratings

On the acceptability survey, peers across the networks rated all 10 items positively. Peers strongly agreed that they understood the reasons for using the conversational strategies to support the student, their training was beneficial, they liked being part of the peer-mediated project, and they felt comfortable with the procedures and their participation, with scores for each item averaging at 6.4 or higher (range: 4–7). Peers also strongly agreed that the intervention improved the students' ability to show interest in others, produced other positive outcomes for the student, and resulted in positive outcomes for themselves and that they would recommend participation to a friend, with means for each item at 6.2 or higher (range: 4–7). Peers moderately agreed with two items: ease of using the conversation strategies ($M = 5.3$, range: 4–7) and things not liked about their participation (reverse scoring; $M = 5.9$, range: 4–7).

Students also rated all items on the SIRF survey positively. All students strongly agreed that the intervention helped them to have better conversations with their peers, the training was beneficial, and there was nothing about strategies for showing interest in their peers, the training, or having lunch conversations that they disliked or made them feel uncomfortable ($M = 7$). They also strongly agreed that they understood the importance of showing interest in others ($M = 6.3$, range: 5–7), that their participation resulted in other improvements (i.e., felt more self-confident and made new friends; $M = 6.7$, range: 6–7), and that they would recommend participation to a friend ($M = 6.7$, range: 6–7). Two items were scored less positively: the ease of using the PF skills ($M = 6$, range: 4–7) and liking using the skills ($M = 6$, range: 4–7) due to neutral ratings (score: 4) for these items by Stephan and Nicolas, respectively.

Network Peers' Ratings of the Students' Conversation

Network peers rated how often the focus students showed interest in them and used each of the PF skills. Mean scores for each item and representative comments describing the peers' observations taken at three points in time are shown in Table 3. Overall, the peers perceived substantial improvements in the students' ability to show interest in them, use of PF skills, and in the overall quality of the conversational interactions following the multicomponent PMI.

Discussion

The PMI that combined peer and student training with the use of a self-reflection cue sheet was highly effective in increasing PF conversational skills by the high school students with ASD in social conversation with their peers in a natural school setting. The intervention effects were replicated across the three students, demonstrating experimental

Figure 2. Frequency of partner-focused questions (open circles). Open triangles indicate generalization probes. Bar graph indicates peer average. Arrow indicates the onset of instructor fading. *Indicates modifications for Stephan.

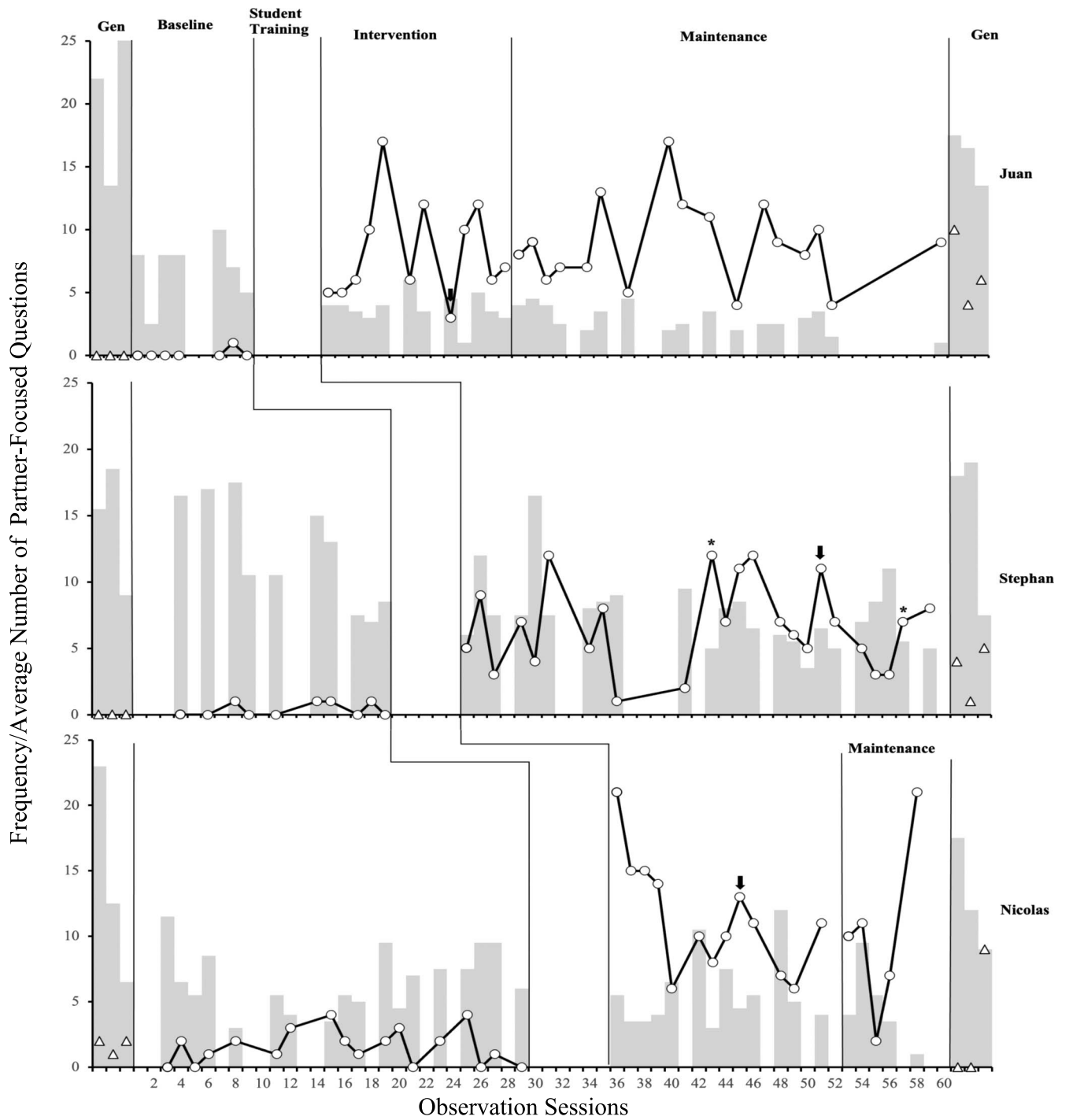


Figure 3. Frequency of partner-focused comments (open squares). Open diamonds indicate generalization probes. Bar graph indicates peer average. Arrow indicates the onset of instructor fading. *Indicates modifications for Stephan.

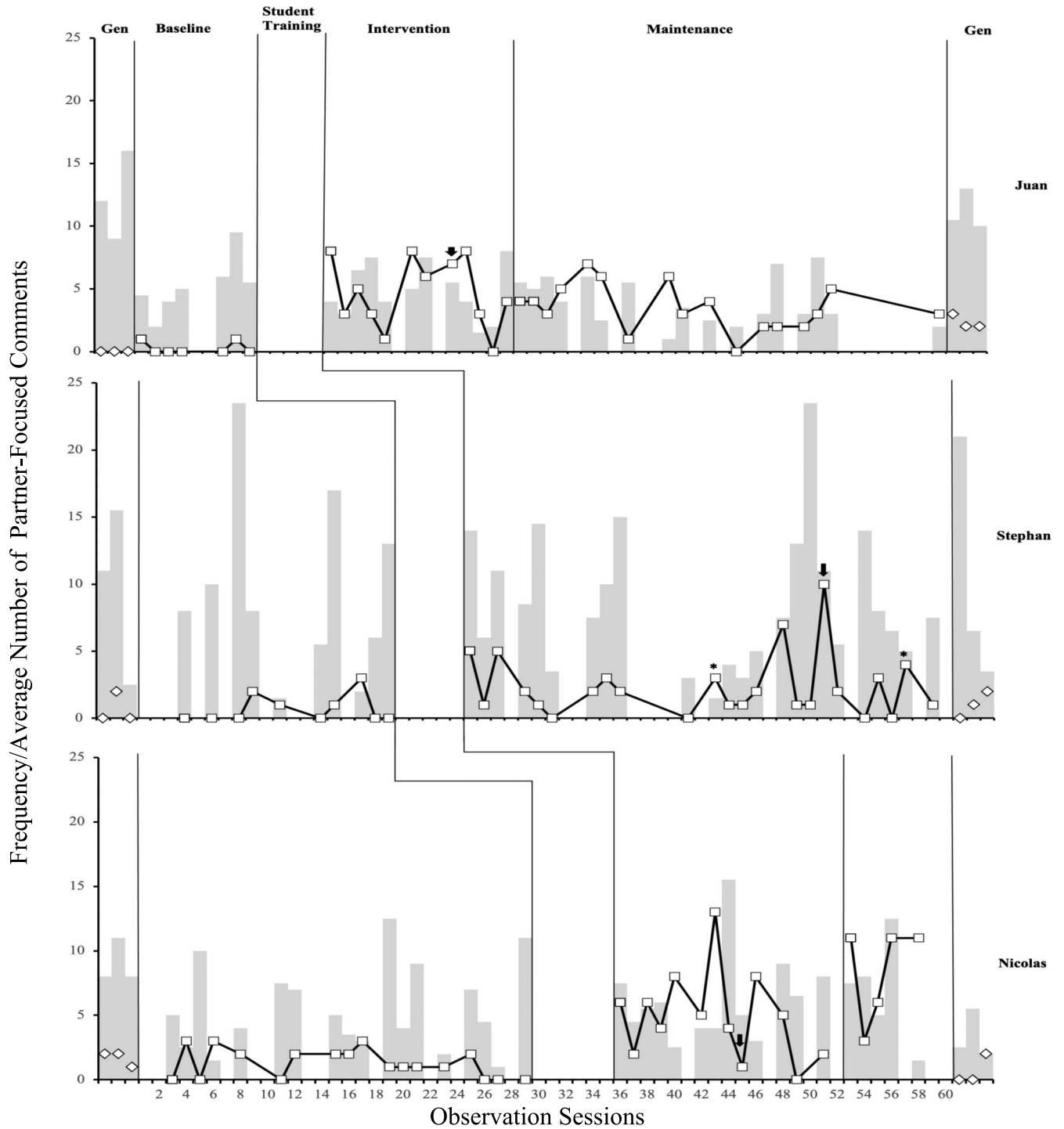


Table 3. Peer network ratings of partner-focused conversation.

Peer network	Phase	1. How often does the student talk about things that interest you?	2. How often does the student ask questions about you and your interests?	3. How often does the student say positive things about what you say or do?	4. Overall, how much does the student show interest in you, your interests, experiences, or feelings?	Overall mean score
Juan	Bl	2.7 (2–3)	2.3 (1–4)	3.7 (3–5)	3.3 (3–4)	3.0 (1–5)
	Int	4.0 (3–5)	4.3 (4–5)	4.7 (4–5)	4.7 (4–5)	4.4 (3–5)
	Mnt	4.0	4.3 (3–5)	4.3 (4–5)	4.7 (4–5)	4.3 (3–5)
	Peer comments	(Pre) He usually [pays] attention to the conversation but doesn't comment as much. (Pre) It feels like a normal conversation for the most part, but at points it's awkward to continue. (Post) More vocally involved and focused in conversations than being distracted. He starts the conversation now. (Post) He has improved so much as far interests and involvement in the conversation.				
Stephan	Bl	2.3 (1–4)	1.7 (1–2)	1.3 (1–2)	2.7 (2–3)	2.0 (1–4)
	Int	3.7 (3–4)	4.0	3.7 (3–5)	4.3 (4–5)	3.9 (3–5)
	Peer comments	(Pre) Talking to Stephan is very interesting because he is a person who has a lot to say about certain things. (Pre) I can tell he feels comfortable with me, but maybe not exactly comfortable with himself. (Post) From then and now, I honestly feel like he cares for me as much as I care for him, based on our conversations. (Post) He is a lot better. He is expressive with his body language and facial expressions. His attitude has improved tremendously and he is often present in the conversation.				
	Peer comments	(Pre) He likes to focus on one topic and doesn't like to change the topic often. (Pre) He doesn't speak much unless it is about what he likes. (Post) Very interested in the conversations. Asks lots of questions about our plans for the day or weekend. (Post) He asks a lot of questions and shows genuine interest.				
Nicolas	Bl	3.0	2.0 (2)	2.0	2.5 (2–3)	2.4 (2–3)
	Int	3.5 (3–4)	4.3 (4–5)	3.8 (3–4)	4.0 (3–5)	3.9 (3–5)
	Mnt	3.8 (3–4)	4.0 (3–5)	3.8 (3–4)	4.0 (3–5)	3.9 (3–5)
	Peer comments	(Pre) He likes to focus on one topic and doesn't like to change the topic often. (Pre) He doesn't speak much unless it is about what he likes. (Post) Very interested in the conversations. Asks lots of questions about our plans for the day or weekend. (Post) He asks a lot of questions and shows genuine interest.				

Note. Scale: 1 = *not at all*, 2 = *a little*, 3 = *so-so*, 4 = *pretty much*, 5 = *a lot*. For peer comments, (pre) was assessed at the end of baseline and (post) was assessed at the end of intervention and/or maintenance. Bl = baseline; Int = intervention; Mnt = maintenance.

control, with one student, Stephan, requiring slight modifications in the intervention procedures to facilitate consistent responses, underscoring the importance of individualizing communication interventions.

These primary outcomes are consistent with previous research that documents the effectiveness of a multicomponent PMI approach for increasing target social communication skills (e.g., Bambara et al., 2016; Kamps, Theimann-Bourque, et al., 2014; Mason et al., 2014). The intervention increased the students' combined use of PF skills as well as each individual skill, PF questions, and comments. Additionally, data revealed that the students used PF skills to initiate and respond to peer topics and interests. Different components may have contributed to these positive outcomes: (a) explicit and systematic instruction to direct the students to attend to partner cues and provide them with multiple exemplars of how they could respond to show interest; (b) use of a self-reflection cue sheet, along with instructor support, to guide students to think about how they used PF skills in conversation with peers and prepare them to start conversations by asking PF questions for their next encounter; and (c) peer training to ensure that peers provided multiple opportunities for the student to apply PF skills within the context of adolescent conversation.

Because we observed that adolescent conversation can be variable, peers were trained prior to baseline to ensure that they were responsive partners and that they provided opportunities for the students to ask PF questions and make

PF comments and to rule out the potential effects of opportunity on the intervention outcomes. Despite peer support during baseline, the students used few PF skills relative to their peer partners. Increases in PF skills were evident only after the addition of the direct instruction components. Consistent with previous studies that have isolated the effects of peer and student training in a multicomponent PMI (e.g., Bambara et al., 2016; Thiemann & Goldstein, 2004), this finding suggests that peer training alone has little impact on improving students' communication skills. Although peer training is important in that it creates a supportive and authentic context for students to practice and refine new skills, it must be used in combination with direct student instruction on the use of skills for intervention effectiveness.

We acknowledge that there are multiple and nuanced ways of showing interest in one's conversation partner through both verbal and nonverbal (e.g., gaze, smiles, and head nods) behaviors. Our approach to intervention was to explicitly teach several well-defined verbal skills (PF questions and comments) that would guide the students to make active contributions to conversations by initiating, acknowledging, and extending conversation topics around their peers' interests and experiences. Prior to intervention, conversation tended to exclusively center around the students' interests. Juan, a passive conversationalist, responded to peer initiatives but rarely initiated or asked any questions. Stephan and Nicolas often dominated conversation by introducing and sustaining topics of self-interest. In all

cases, when the students exhibited few PF skills during baseline, the network peers used PF skills at high frequencies. This may be explained by the peers' natural inclination to use the target skills to show interest in others but also may have been an attempt to maintain conversational interaction in response to the students' difficulty shifting conversation away from themselves. Once the full intervention was implemented, the students used PF skills to successfully orient conversation around their peers while the peers' use of these skills either decreased or maintained, establishing more balanced or reciprocal conversational interactions.

Students were encouraged to use individual PF skills flexibly, initiating and following up on any peer verbalization that was of interest to them. However, all students used PF questions more frequently and consistently across sessions than PF comments. This finding may be partially influenced by our training that emphasized asking PF questions to both initiate and extend conversations, whereas commenting was taught only in response to what peers had said and was limited to specific types (e.g., observations, encouragement, and empathetic statements) by our definition. On the other hand, students may have found commenting, which seems to require greater relational abilities (Fletcher-Watson et al., 2013) more difficult to produce. Studies have shown commenting to be especially challenging for students with ASD in maintaining reciprocal exchanges (e.g., Jones & Schwartz, 2009; Paul et al., 2009). Nevertheless, although variable, commenting did improve for all students, and students often used them in combination with questions to extend conversation around peer-focused topics to show interest. Sample student-peer exchanges located in Supplemental Materials S4 and S5 illustrate this point.

Both Juan and Nicolas maintained gains on all dependent measures with trained peers once instructional support was withdrawn. Juan maintained skills for 8 weeks, demonstrating the potential strength of the intervention for some students. However, Stephan did not progress to maintenance and benefitted from two modifications that provided additional instruction and reminders to use PF skills to facilitate consistent responding during intervention and as the instructor faded support. We observed that, unlike Juan and Nicolas, Stephan had difficulty focusing conversation on his peers once he introduced certain topics, particularly events or relationships that troubled him. Perhaps given more time to slowly fade instructional support, maintenance would have been achieved. Alternatively, Stephan's difficulty may reflect room for improving the intervention for learners who struggle with perseveration. Perhaps the intervention can be improved by incorporating direct instruction and feedback on how to manage problem topics that could interfere with reciprocal interactions.

Following intervention, all three students showed some generalization of skill use with untrained peers, although results varied. Juan showed the greatest improvements using both PF skills to converse with new peers. Stephan and Nicolas showed modest gains generalizing only PF questions. Mixed generalization results are not uncommon in PMI research and speak to the complexity of social contexts

and the multiple influences on conversational interactions (e.g., motivation, familiarity or comfort with conversation partners, and opportunity to use skills). The intervention was highly effective in helping students transfer skills practiced with the instructor to conversations with trained network peers in the high school cafeteria with no direct adult facilitation during the interactions; however, post-intervention instruction may be needed to assist some students to extend skills across varied social contexts. This may include an analysis of the factors that might inhibit generalization followed by additional instruction on how to apply newly learned skills when students encounter new conversation partners or social situations.

An important finding was that the participants confirmed the social validity of the intervention. SIRF survey ratings indicated that peers and students enjoyed the intervention and believed that it resulted in positive outcomes. Ratings were universally high for most items; however, both groups rated the ease of implementing strategies or PF skills somewhat less positively, suggesting that learning new ways of conversing is not easy at first, confirming our decision to provide initial implementation supports (e.g., reminders to strategies or skills, review of the self-reflection cue sheet) for both students and peers. Most importantly, peers enthusiastically acknowledged the students' improved ability to show interest in them, indicating that the intervention outcomes were meaningful and relevant. Interestingly, some peers noted additional improvements in Juan and Stephan's affect (see peer comments in Table 3). With similar reports of affective change made in other intervention research addressing the social conversation of teens with ASD (Ko et al., 2019), future studies might explore how the current intervention, focused on verbal communication, may also impact nonverbal ways of showing interest. Furthermore, gathering social validity data from peers not involved in the study would be useful in determining whether student gains are perceptible and meaningful to others.

Limitations of this study suggest other areas for future research. First, the relative contribution of each component in this study remains unclear. As discussed, this study and previous PMI research indicate that some combination of peer and student training is important for improving social communication skills; however, continued research is needed to explore the critical ingredients of the intervention components and how they work together to affect change. Particular attention is needed to determine the intensity of the intervention (e.g., dose, intervention form, and time in intervention) to produce efficient and optimal outcomes. A second limitation was that the intervention was carried out by research staff, not school personnel. Our focus was in establishing the initial effectiveness of the PMI for an underresearched pragmatic language difficulty while designing the intervention to fit high school environments (e.g., brief trainings, 25-min trainings, separate peer and student trainings outside the cafeteria to accommodate different schedules, minimal adult support in the cafeteria, and no adult interaction when the participants were conversing). To further explore feasibility

and contextual fit, future researchers should consider ways of implementing components of the intervention in typical school routines or other peer support programs by school staff, ideally using a team approach to share training and supervision responsibilities. Finally, as there are other ways of showing interest in one's conversation partner, future researchers might consider how PMI can be used to improve other communication targets individualized to the needs of adolescents with ASD.

In conclusion, this study extends research (e.g., Bambara et al., 2016, 2018; Thomas & Bambara, 2020) by providing additional evidence that PMI can be successfully adapted to fit high school settings and result in improved conversational abilities of adolescents with ASD in natural settings. Second, it provides an effective and novel intervention for addressing a common pragmatic language difficulty that is challenging for many individuals with ASD, namely, introducing and maintaining topics of conversation of relevance and interest to conversation partners (e.g., Paul et al., 2009). Regardless of the hypothesized explanations for why individuals with ASD might not show interest in their conversation partners, the intervention that taught the students to attend to relevant partner cues (e.g., "listen to what your friends are saying") and initiate and respond using varied and multiple options was highly successful in creating more PF conversations. Given that a PF orientation has been identified by adolescents as being important in friendships (e.g., Reed & Trumbo, 2020), this intervention holds strong promise for fostering and improving peer relationships and is worthy of continued investigation to evaluate its full potential impact.

Author Contributions

Linda M. Bambara: Conceptualization (Equal), Investigation (Equal), Writing – original draft (Lead), Writing – review & editing (Lead). **Christine L. Cole:** Conceptualization (Equal), Investigation (Equal), Writing – review & editing (Supportive). **Alana Telesford:** Data curation (Lead), Formal analysis (Supporting), Supervision (Supporting). **Kathleen Bauer:** Data curation (Supporting), Methodology (Supporting). **Irem Bilgili-Karabacak:** Conceptualization (Supporting), Methodology (Supporting), Writing – original draft (Supporting). **Amanda Weir:** Methodology (Supporting), Supervision (Supporting), Writing – original draft (Supporting). **Amanda Thomas:** Methodology (Supporting), Supervision (Supporting).

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