

# Increasing Conversational Interactions Between Verbal High School Students With Autism and Their Peers Without Disabilities

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## Abstract

Self-prompted communication books were used in combination with conversational peer orientation to increase conversational interactions of verbal high school students with autism or autistic-like behavior with their peers without disabilities. Previous investigators have used communication books only with students with autism or intellectual disability with limited or no verbal or reading skills. The six high school participants in this study could read and were verbal. We sought to determine whether the communication books would be accepted by peers without disabilities in general education classrooms or whether the books would stigmatize the students with disabilities. Finally, we assessed the effects of having a peer with a learning disability as the teacher of conversational interaction skills. We interpreted our results to conclude that the communication book package was associated with increased conversational interactions for all participants with their general education peers and that communication books were viewed positively by conversational partners.

## Keywords

autism, high school, communication books, general education peers, conversational interactions

High school can be an awkward and isolating experience for students with autism or autistic-like behavior, particularly for those who have higher verbal skills and milder forms of autism, who also are attending general education classes. Difficulty interacting with peers is a hallmark characteristic of autism regardless of a student's cognitive or language skills (White, Koenig, & Scahill, 2010). Whereas peers in general education may readily attribute social skills limitations to the presence of a disability among students who exhibit symptoms of classic autism (e.g., stereotypic motor behaviors, echolalic speech), they may be less likely to associate social interaction challenges to a disability among students without such overt symptoms (Church, Alisanski, & Amanullah, 2000). For example, peers without disabilities may interpret topic perseveration or limited conversational turn-taking simply as “poor manners” or “ignorance” rather than as a symptom of autism or related disability if students have fairly complex language.

Limited social interaction skills can be particularly problematic in high school where conversation becomes the standard medium for communication among students and teachers (Hendricks & Wehman, 2009). Church et al. (2000) observed five high school students with autism who had complex speech skills but who did not engage in

reciprocal conversation with peers or teachers. Instead, three of the students engaged in lengthy monologues in monotone voices on topics of their own interest, whereas two others rarely initiated conversation. The students, all male, expressed an interest in meeting female students but reported not knowing how to approach girls or start a conversation.

Nevertheless, few published social skills interventions have been conducted in high schools among students with autism and their peers in general education (Hendricks & Wehman, 2009; Reichow & Volkmar, 2010). Most researchers addressing social skills among students with autism and their peers have targeted pre- or elementary-school students (Bellini, Peters, Benner, & Hopf, 2007). A recent review of the literature identified only eight published studies conducted in general education public school settings among high school students with autism in which peers were involved in training and/or generalization

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sessions (Hughes et al., 2012). Social skills intervention strategies found to be effective included social problem-solving instruction (e.g., Davis, Boon, Cihak, & Fore, 2010), peer involvement (e.g., Gaylord-Ross, Haring, Breen, & Pitts-Conway, 1984), and use of communication books (e.g., Hughes et al., 2011).

The only social skills intervention identified in the literature review (Hughes et al., 2012) to be introduced to high school students with autism and extensive verbal skills and their general education peers was social problem-solving instruction (Davis et al., 2010; Plienis et al., 1987). Specifically, participants in these studies were taught conversational skills, such as commenting on peers' personal interests, and a strategy to use to problem-solve when and how to use their conversational skills with peers. Unfortunately, there was limited generalization of social skills across novel peers when trainer assistance was withdrawn. In contrast, teaching high school students with autism to use communication books to initiate conversation with peers in general education was associated with generalization of conversational skills across novel peers during 15 to 70 generalization probes across participants in two studies identified in the literature review (i.e., Hughes et al., 2000; Hughes et al., 2011). Communication books typically are small, handheld, bound pages or cards that are teacher- or researcher-constructed and contain pictures or phrases used to prompt communication (e.g., Hunt, Alwell, Goetz, & Sailor, 1990). In the Hughes et al. (2000, 2011) studies, participants were taught to prompt themselves to turn pages in their books to ask conversational partners questions printed on each page. It may be that the communication book strategy served as a self-prompting mechanism to maintain conversational interaction of participants in these studies.

The use of communication books to increase social interaction among high school students with autism and their general education peers shows promise. Published studies, however, have included only high school students with very limited verbal skills and severe autism and/or intellectual disability (Hughes et al., 2000; Hughes et al., 2011). Considering the social isolation typically experienced by high school students with more extensive verbal skills (White et al., 2010), it may be worthwhile to investigate the feasibility of communication books among this population as a means to increase their social interactions with peers in general education. Gaylord-Ross et al. (1984) suggested communication books could serve as a "social prosthetic" providing conversational content of mutual interest to conversational partners. Therefore, one purpose of the current study was to systematically replicate Hughes et al. (2011) among a group of verbal high school students with autism (one with autistic-like behavior) and their peers in general education. We wanted to investigate the feasibility of extending the use of communication books to verbal high

school students with autism, as well as those with co-occurring disabilities, such as anxiety, to assess the effectiveness of communication books across a range of the autism spectrum. Specifically, we sought to find out whether students with autism and more complex verbal skills who attended general education academic classes and who said they wanted to but rarely interacted with their classmates would agree to use communication books to increase their peer interaction. Furthermore, we investigated whether the books would be viewed as acceptable by peers in general education classrooms or whether the books would stigmatize students whose verbal skills may mask their need for social skill instructional support.

In addition, in previous communication book studies among high school students with autism or severe intellectual disability, either peers without disabilities (e.g., Hughes et al., 2000) or researchers (e.g., Hughes et al., 2011; Hunt et al., 1990) taught participants to use communication books. Although both peers in general education and researchers have been effective in promoting the acquisition and generalization of communication book use, having adult researchers or classmates without disabilities teach these skills to verbal students with autism could be stigmatizing in itself. Consequently, we sought to minimize further social isolation of participants by having a familiar peer with disabilities teach communication book use in a school setting outside the general education class, and then assess generalization effects within participants' general education classes. Specifically, we assessed the effects of having a peer with a learning disability as a teacher of conversational interaction skills among verbal high school students with autism or autistic-like behavior.

## Method

### Participants

Participants attended a public high school located in an urban school district of 78,000 students in the southeastern United States. Total school enrollment was 1,137 students, of which 56% of students were Black, 37% White, 4% Hispanic, and 3% Asian. Forty-six percent of students were eligible for free or reduced-cost lunch.

Three males and three females were selected to participate in the study. Selection criteria were (a) a diagnosis of autism as identified in school records and the second edition of the *Childhood Autism Rating Scale* (CARS2; Schopler, Reichler, & Renner, 2010; five students) as conducted by a psychologist with 20 years experience working with individuals with autism and trained to use the CARS2 for diagnostic purposes or autistic-like behavior with a co-occurring related disorder (i.e., anxiety and conversion disorders; one student), (b) no or mild intellectual disability, (c) reading and speaking skills at least at a sixth-grade level (three read

**Table 1.** Participant Characteristics.

Participant	Diagnosis/IQ assessment	Adaptive behavior assessment	Medical/behavioral history	Medication
Harold, 16, White male	Autism, intellectual disability, 60, <sup>a</sup> 50 <sup>b</sup> (severe ASD)	Composite = 76 <sup>c</sup>	Historical diagnosis of PDD-NOS, history of communication impairments and social skills deficits	Clonidine for ADHD
Jordan, 17, Black male	Autism, intellectual disability, 57, <sup>d</sup> 43 <sup>b</sup> (severe ASD)	Composite = 50 <sup>e</sup> Communication = 50 <sup>e</sup> Daily living = 56 <sup>e</sup> Socialization = 56 <sup>e</sup>	History of language delay and anxiety	History of Adderall and Paxil for depression and anxiety
Kaylie, 17, White female	Asperger syndrome, visual impairment, 110, <sup>d</sup> 43 <sup>b</sup> (mild to moderate ASD)	Composite = 95 <sup>c</sup>	Legally blind; history of self-stimulatory, tantruming, and non-compliant behaviors	None reported
Brittany, 18, Black female	Visual impairment, autistic-like behaviors, 98 <sup>d</sup>	Composite = 82 <sup>e</sup> Communication = 81 <sup>e</sup> Daily living = 81 <sup>e</sup> Socialization = 91 <sup>e</sup>	Legally blind, conversion disorder, anxiety disorder, history of social isolation and depression	Paxil, history of Prozac for depression
Maya, 18, Black female	Autism, intellectual disability, 56, <sup>d</sup> 41 <sup>b</sup> (mild to moderate ASD)	Composite = 74 <sup>e</sup> Communication = 76 <sup>e</sup> Daily living = 85 <sup>e</sup> Socialization = 85 <sup>e</sup>	Historical diagnoses of anxiety disorder and PDD-NOS <sup>d</sup>	None reported
Hugh, 16, White male	Specific learning disability, ADHD, autism, 102, <sup>d</sup> 28 <sup>b</sup> (mild to moderate ASD)	Composite = 34 <sup>f</sup>	Historical diagnoses of Asperger syndrome and ADHD, previously treated for depression, history of social impairment, engages in skin picking	Vyvanse XR for ADHD

Note. ASD = autism spectrum disorders; PDD-NOS = pervasive developmental disorder-not otherwise specified; ADHD = attention-deficit/hyperactivity disorder.

<sup>a</sup>Stanford-Binet (4th ed.). <sup>b</sup>Childhood Autism Rating Scale (CARS2; 2nd ed.). <sup>c</sup>Adaptive Behavior Assessment System (ABAS). <sup>d</sup>Weschler Intelligence Scale for Children (WISC-IV; 4th ed.). <sup>e</sup>Vineland Adaptive Behavior Scale. <sup>f</sup>Behavior Assessment System for Children 2 (BASC-2).

at grade level), (d) teacher report of a need to increase social interaction with general education peers, (e) systematic direct observation of low rates of interaction with general education peers using the same dependent measures as used in the study, (f) a participant-stated goal to have more friends at school, and (g) enrollment in a minimum of two academic classes in general education. Written parental permission was obtained for all participants, as well as students' verbal and written assent to participate. These six students represented all students meeting criteria in the school other than one additional student for whom parent permission was not obtained. Students were not receiving any additional language or social skills instruction to address their social engagement. Table 1 contains a summary of participant characteristics.

Harold frequently engaged in stereotypic behavior such as self-talk or rubbing his arms or knuckles. He rarely interacted with peers in his general education classes, but occasionally stood near them in the hallway or at lunch. When he noticed an item of interest, such as a cartoon character on a student's backpack, Harold was observed to

stand uncomfortably close to the student, who often walked away. He occasionally conversed with adults about repetitive topics, such as cartoons or animated movies.

Jordan walked rapidly through the hallways between classes, occasionally greeting peers without disabilities but rarely sustaining conversation. In addition to his rapid movements, Jordan often listened to music on a headset, further restricting conversation with peers. When he conversed with classmates, Jordan tended to talk repetitively about negative topics, such as poor grades or family problems, which peers indicated was disturbing to them. Jordan rarely smiled; instead, he often appeared depressed or angry (e.g., making comments such as "I'm gonna Taser that kid . . .").

Kaylie periodically engaged in stereotypic behavior, including smelling objects, self-talk, and rubbing her face, particularly when faced with making a decision or experiencing stress (e.g., making comments such as "Well, I don't know what I want! I never have enough time!"). Her social interactions were generally limited to classmates with

visual impairments. When Kaylie interacted with peers without disabilities, she typically spoke in a monologue, giving peers little opportunity to reciprocate. Kaylie independently navigated the school hallways with a mobility cane and read Braille proficiently.

Brittany was diagnosed with conversion disorder and had seizure episodes assumed to relate to emotional stress. She typically interacted only with other students with visual impairments. During her infrequent conversations with peers without disabilities, Brittany often talked about negative topics, such as displeasure with peers and school. Brittany also was observed to ask unfamiliar peers for their phone numbers. She moved independently around school with a mobility cane and read Braille proficiently.

Maya's social interactions typically occurred only with two female peers who were in her special education classes. Maya rarely initiated or reciprocated conversation with classmates without disabilities. During independent academic tasks, she often put her head down on her desk. Although typically quiet in class, Maya occasionally engaged in disruptive behavior at which time she would shout orders at peers or act overtly flirtatious with male students, causing teachers to request that she quiet down or leave the room.

Hugh displayed autistic-like behaviors, such as face- and arm-picking, limited peer interaction, and restricted conversational topics. In class, Hugh rarely interacted with peers without disabilities. At lunch, he often stood near groups of students without disabilities, but did not initiate to or interact with them. Hugh was a member of the school's anime club and orchestra but often spent his lunch period trying to locate peers from these groups with whom to eat.

### Peer Trainer

David, a 17-year-old Black male who received special education services for a learning disability, served as a peer trainer for all participants. David was recommended by his special education case manager to serve as the trainer because of the positive rapport he had with participants. In addition, David was able to speak spontaneously and with apparent confidence to peers and adults on a variety of topics. When his role as peer trainer was explained to him prior to intervention, David agreed to participate.

### Conversation Partners

Thirty-eight students in general education served as conversational partners during intervention, of which 21 were female (10 White, 7 Black, 2 Hispanic, 2 Asian) and 17 were male (9 Black, 8 White). Number of conversational partners per participant were as follows: Harold (11), Jordan (14), Kaylie (13), Brittany (13), Maya (13), and Hugh (10);

some students served as partners for more than one participant. Selection criteria for conversational partners were an expressed interest in interacting with peers with disabilities and enrollment in the same general education class or lunch period as the participant. For classroom interactions, we asked teachers to identify potential conversational partners. For interactions during lunch, we asked the participants' special education case manager, who was one of the school's football and softball coaches, to identify potential partners from his sports teams.

### Settings

Baseline and generalization data were collected in participants' general education academic classes (e.g., anatomy, personal finance, Spanish) and at various locations during lunch. The school had an "open lunch" policy, during which students could choose to eat in the hallways, school courtyard, classrooms, or cafeteria. Communication book training occurred during lunch in the special education case manager's classroom. Because the case manager was a sports coach, many members of his teams and their friends socialized or ate lunch in the classroom. Some special education students also ate lunch in the same room, totaling an average of 10 students typically in the room. General education classes typically averaged 25 to 35 students per class.

### Communication Books

During intervention, the peer trainer taught participants to use communication books to initiate social interactions (e.g., Hughes et al., 2011; Hunt et al., 1990). Communication books were composed of 3- × 4-inch laminated pages, which were hole-punched and bound. Each page contained a printed conversational "opener" identified by culturally diverse groups of general education high school students as questions they used to start conversations with their peers at school (Hughes et al., 1999; Hughes et al., 2011). Example questions included "What are you doing this weekend?" and "What kind of music do you like?"

Communication books contained 10 to 20 pages, organized to provide a variety of topics (e.g., sports, school events, recreational interests). Three variations of communication books were used to accommodate participants' individual needs: (a) those composed of a typed conversational opener with a corresponding Picture Communication Symbol® (Mayer-Johnson, 2008) for students with limited oral reading skills (Harold, Jordan, and Maya), (b) those with only a typed conversational opener for more skilled readers (Hugh), and (c) those with conversational openers printed in Braille with the English equivalent printed underneath used with participants who were blind (Kaylie and Brittany).

## Dependent Variables

Dependent variables assessed during generalization sessions were (a) percentage of intervals in which interaction occurred between a participant and a partner, (b) percentage of intervals in which a participant initiated or a partner responded, and (c) percentage of intervals in which a partner initiated or a participant responded. *Initiating* was defined as producing a verbal or nonverbal behavior toward a conversational partner that introduced a new topic or expanded on a previous topic (Fey, 1986; Hughes et al., 2011). Initiating included turning to, pointing to, or verbalizing a new conversational opener from a participant's conversational book. *Responding* was defined as producing verbal or nonverbal behavior in response to a conversational partner's initiation (without expanding on a topic or adding new information to a prior utterance) or asking for clarification (Fey, 1986; Hughes et al., 2011). Responding included verbalizations, gestures, or signs.

Qualitative measures assessed were (a) affect of participants and partners during interaction, (b) quality of interaction, and (c) reciprocity of interaction (e.g., Carter, Hughes, Guth, & Copeland, 2005). *Affect* was rated on a 5-point Likert-type scale ranging from (1) *discouraging of interaction* (e.g., frowning, looking away, lacking facial affect) to (5) *encouraging of interaction* (e.g., smiling, maintaining eye contact, responding frequently). *Quality of interaction* was rated on a 5-point Likert-type scale from (1) *low* to (5) *high* based on frequency, duration, and overall affect of interaction between participants and partners. *Reciprocity of interaction* was defined as the degree to which a participant and partner equally initiated conversational interaction. Reciprocity was rated using a 7-point Likert-type scale in which 1 = *general education partner was primary initiator*, 4 = *general education partner and participant initiated equally*, and 7 = *participant was primary initiator*.

We observed participants and partners once daily during 5-min sessions throughout baseline and communication book use conditions. We used a 10-s partial-interval recording system to assess initiations and responses. Conversational topics were tallied as they occurred. Immediately following a session (a) student affect and (b) quality and reciprocity of interaction were rated if an interaction had occurred. No students (partners or participants) were aware that conversations were being coded.

**Observers and observer training.** Observers were 10 graduate students in special education. Prior to collecting baseline data, all observers read and discussed coding definitions, rules for scoring, and observation procedures. Observers then practiced observing and recording by watching videotapes of students conversing, followed by in situ coding. Discrepancies in coding were discussed until agreement was reached. Observers were required to reach a criterion of 80% interobserver agreement for all outcome measures for two consecutive practice sessions before collecting data.

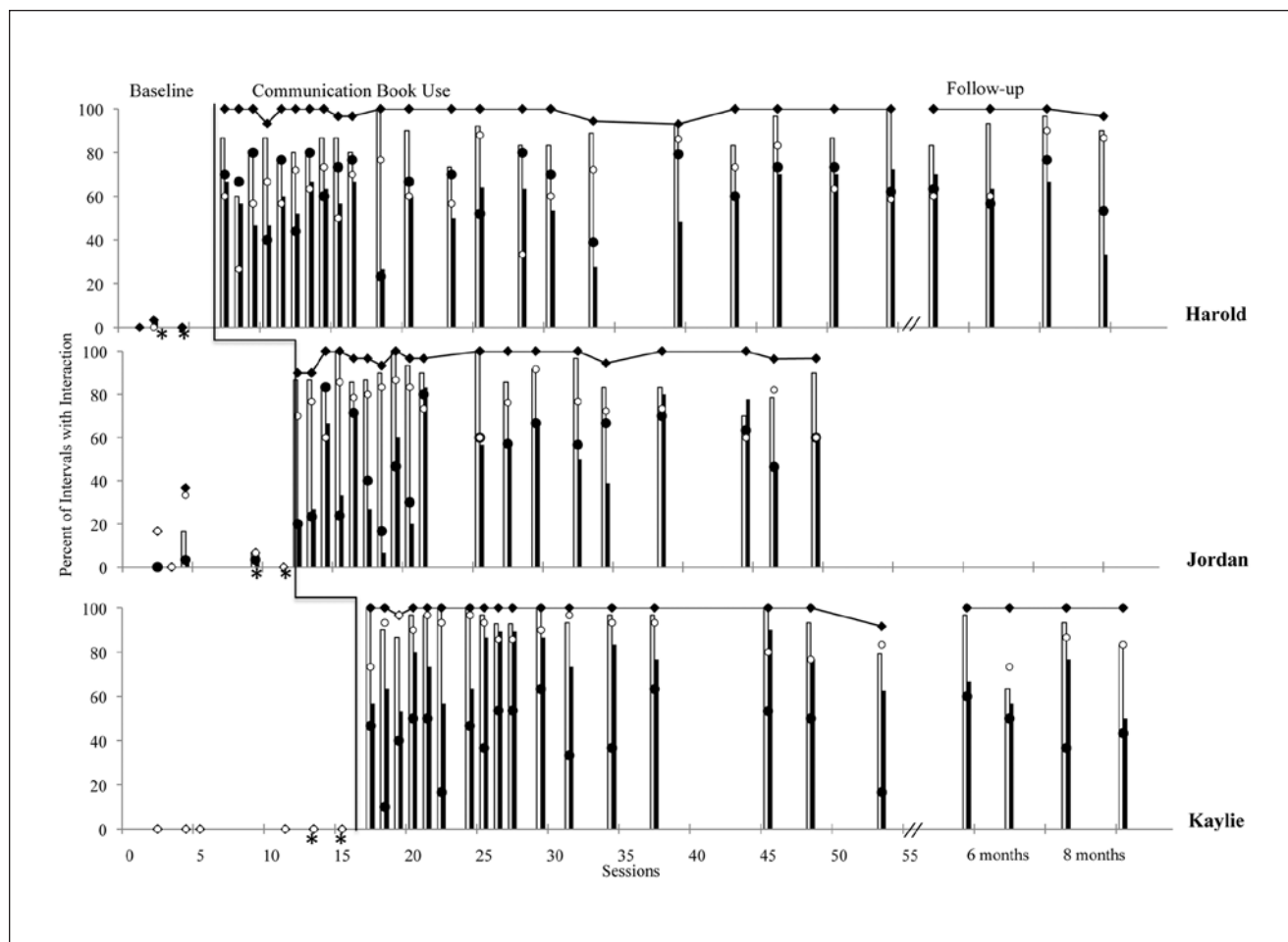
**Interobserver agreement.** Interobserver agreement was assessed during 46% of baseline sessions and 52% of communication book sessions per participant per condition. The point-by-point method of agreement (Kazdin, 1982) was used to assess percentage agreement for all dependent measures. Overall interobserver agreement means and ranges were as follows: overall interaction = 88% (range = 50%–100%), participants' initiations = 90% (range = 63%–100%), partners' responses = 91% (range = 50%–100%), partners' initiations = 85% (range = 50%–100%), participants' responses = 86% (range = 36%–100%), participants' affect = 99% (range = 75%–100%), partners' affect = 99% (range = 50%–100%), quality of interaction = 99% (range = 50%–100%), and reciprocity of interaction = 95% (range = 50%–100%).

## Experimental Design and Conditions

A multiple-baseline design across participants (Kazdin, 1982) with a multiple-probe component (Horner & Baer, 1978) was used to evaluate the effects of communication book use on participants' social interactions. The study consisted of two experimental conditions: (a) baseline and (b) communication book use, during which generalization data were collected daily. Communication book training occurred during the final two days of baseline for each participant after baseline data were taken for the day, after which training was completely withdrawn (asterisks on Figures 1 and 2 indicate when training sessions occurred). Follow-up data were collected 6 to 8 months following the termination of the communication book use condition using procedures identical to those of communication book use, as described below. Procedures were adapted from Hughes et al. (2011), as follows.

**Baseline.** During 5-min baseline sessions, we observed a participant and the peer without disabilities in closest proximity (i.e., within speaking distance) while they were engaging in expected activities (e.g., completing assignments in class or during lunch). No instructional feedback was provided to participants or peers and the environmental arrangement of the setting was not altered in any way.

**Communication book training.** The peer trainer taught each participant individually to use a communication book to initiate conversation during the final 2 days of each participant's baseline following data collection. Training sessions averaged 11 min (range = 7–20 min). Training began with Harold, with training for the other five participants following sequentially. Just prior to the first day of Harold's training, a researcher (who did not serve as a data collector) taught the peer trainer to follow a script when training. The script was adapted from Hughes et al. (2011) to meet the peer trainer's individual needs (i.e., wording was simplified and typed in large print) and followed the same sequence on



**Figure 1.** Conversational interaction for Harold, Jordan, and Kylie.

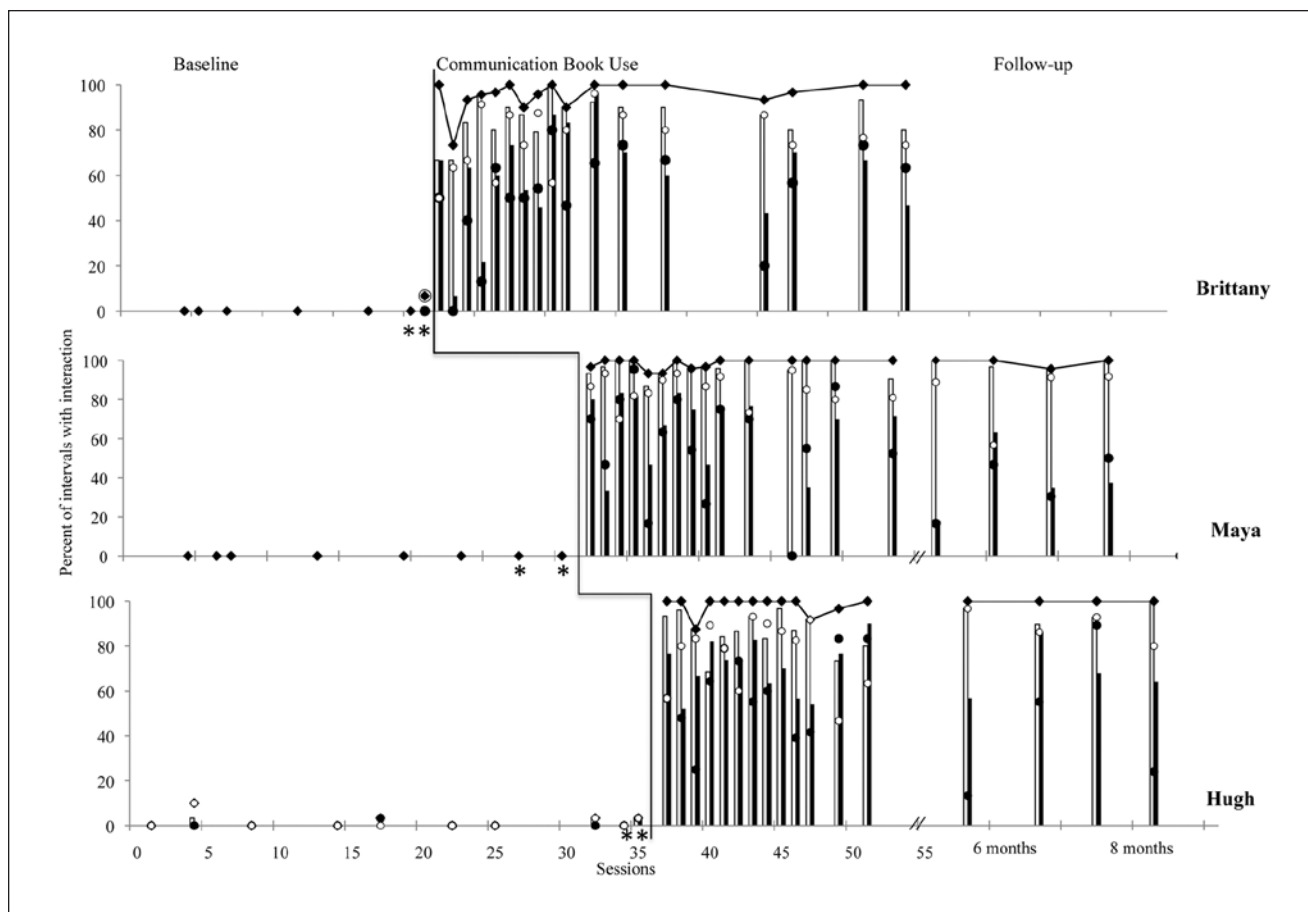
Note. Closed diamonds represent percentage of intervals of overall interaction between the participant and partner during baseline and intervention. Open circles represent the participant’s percentage of intervals initiating, and open bars represent the partner’s percentage of intervals responding. Closed circles represent the partner’s percentage of intervals initiating, and closed bars represent the participant’s percentage of intervals responding. Asterisks represent training sessions.

both days of training (script available on request). First, the peer trainer stated, “I would like to help you learn to talk to your friends and other people at school. Would you like to try?” Each participant responded affirmatively, after which the peer trainer used direct instruction (e.g., modeling, prompting, repeated practice, contingent praise) to teach participants to read the question on the first page in the communication book, wait for a response, turn to the next page, and ask the next question. After the peer trainer modeled the sequence with the entire communication book, the participant practiced using the book to ask the questions to the peer trainer. At the end of each training session, the peer trainer reminded the participant to use the book when talking to friends.

*Communication book use.* Training was completely withdrawn on Sessions 7, 12, 17, 22, 32, and 37 for Harold,

Jordan, Kaylie, Brittany, Maya, and Hugh, respectively, to assess generalization of conversational interaction with a peer without disabilities. At the beginning of each session, we asked participants whether they would like to converse with an identified peer (see conversational partner orientation below). Upon receiving an affirmative response, we then introduced the participant and partner if they were not familiar with each other. To minimize researcher assistance and prompt peer engagement, we handed the communication booklet to the partner who then handed it to the participant while they greeted each other. No prompting or instructional feedback was provided. In addition, the peer trainer was not present during any communication book sessions to assess generalization of communication book use.

*Conversational partner orientation.* Prior to conversational partners’ first interaction with a participant, we explained



**Figure 2.** Conversational interaction for Brittany, Maya, and Hugh.

Note. Closed diamonds represent percentage of intervals of overall interaction between the participant and partner during baseline and intervention. Open circles represent the participant's percentage of intervals initiating, and open bars represent the partner's percentage of intervals responding. Closed circles represent the partner's percentage of intervals initiating, and closed bars represent the participant's percentage of intervals responding. Asterisks represent training sessions.

that the participant was learning to talk to new friends at school. We then showed the communication book to the partners and explained that the participant would use the book to ask them conversational questions. Partners were instructed to respond to the participant as if they were talking to a friend. They were also encouraged to ask reciprocal questions (e.g., “Yes, I have two dogs. Do you have any pets?”). We also provided the conversational partner with a brief description of the participant's conversation style (e.g., “Sometimes Harold is slow to respond so you may need to wait for him to answer a question” or “Kaylie has a visual impairment so she reads Braille.”).

### Fidelity Measures

We measured fidelity of training during all training sessions across participants by having an independent data collector observe the peer trainer and record each step completed of a

9-item training script. Mean training fidelity was 99% (range = 86%–100%). An independent data collector also measured fidelity of intervention procedures during all communication book use sessions using an 11-item checklist of intervention components (e.g., consent of participant obtained, book handed to partner, participant turned page in book). Mean fidelity during intervention was 99% (range = 89%–100%).

## Results

### Generalization Sessions

**Percentage of intervals interacting.** Closed diamonds on Figures 1 (Harold, Jordan, and Kaylie) and 2 (Brittany, Maya, and Hugh) indicate percentage of intervals in which participants and peers interacted across baseline, communication book use, and follow-up sessions. During baseline, participants rarely interacted with peers in general education ( $M = 1.9\%$  of intervals of interaction per session across participants, range = 0%–37%). All participants immediately

increased and maintained their interactions with peers following the introduction of communication book use. Mean percentage of intervals in which interaction occurred during communication book use sessions was 99%, 97%, 99%, 96%, 98%, and 98% for Harold, Jordan, Kaylie, Brittany, Maya, and Hugh, respectively. Interaction maintained with little variability across the four participants who were assessed during follow-up sessions conducted during the next school year (two students had graduated) 6 to 8 months after termination of communication book use.

**Percentage of intervals in which participants initiated or partners responded.** Open circles on Figures 1 and 2 represent percentage of intervals in which participants initiated to conversational partners. During baseline, participants rarely initiated conversation with peers in general education, with the exception of Jordan during only two sessions when he initiated conversation during 17% and 33% of intervals. During 39 baseline sessions across the six participants, initiations occurred during only 2% of intervals with few partner responses (open bars). When participants used their communication books, their percentage of intervals initiating increased to within a previously established range of expected behavior for students without disabilities conversing informally (30%–80% time initiating; Hughes et al., 1999). Mean initiations were 64%, 75%, 90%, 76%, 85%, and 77% for Harold, Jordan, Kaylie, Brittany, Maya, and Hugh, respectively. Conversational partners' responses increased systematically across participants to a range of 85% (Harold and Kaylie) to 96% (Maya), suggesting that conversation was reciprocal across dyads.

**Percentage of intervals in which partners initiated or participants responded.** Closed circles on Figures 1 and 2 represent the percentage of intervals in which partners initiated to participants. During baseline, peers without disabilities initiated to participants during only a mean of 0.4% (range = 0%–3%) of intervals across participants. During communication book use, partners' mean initiations to participants increased to within the established normative range across all participants (Harold = 64%, Jordan = 52%, Kaylie = 42%, Brittany = 51%, Maya = 57%, Hugh = 59%). Participants' mean responses (closed bars) increased similar to a range of 50% (Jordan) to 73% of intervals (Kaylie). Graphed data indicate considerable correspondence between occurrence of partner initiating and participant responding per session.

**Conversational topics discussed.** Conversational topics discussed most frequently by participants and partners during communication book use sessions were academically related school events (e.g., teachers, classes, assignments), nonschool events (e.g., jobs, afterschool activities, families), and entertainment (e.g., television shows, movies,

bands). Mean number of topics discussed per 5-min session was 4 (range = 3–8), suggesting that a variety of expected topics (as established by normative comparison; Hughes et al., 1999) was discussed among participants and partners during conversational interactions.

**Affect ratings.** Affect ratings during communication book use approached the high end of the scale (5.0 = *inviting of interaction*) for all participants except Jordan, whose mean affect score was 3.3 (*neutral*). Specifically, mean ratings were 4.2 (Harold), 4.6 (Kaylie), 4.2 (Brittany), 4.5 (Maya), and 4.1 (Hugh). Mean partner affect ratings during communication book use consistently approached *inviting of interaction* across all participants (4.6, 4.5, 4.4, 4.7, 4.6, and 4.5 when partners interacted with Harold, Jordan, Kaylie, Brittany, Maya, and Hugh, respectively). Interestingly, Jordan's somewhat lower affect as perceived by raters did not correspond with lower partner affect ratings.

**Quality and reciprocity of interaction.** Mean quality of interaction ratings were generally high across participants, with the lowest mean score (3.9) for Jordan. Ratings for the remaining participants were 4.6 (Harold), 4.5 (Kaylie), 4.7 (Brittany), 4.5 (Maya), and 4.5 (Hugh). Reciprocity of interaction scores suggested that guiding of conversation was shared more equally when partners interacted with Harold, Jordan, Brittany, and Hugh, for whom mean scores ranged from 4.1 to 4.5 (4 = *guidance equally shared*). Mean reciprocity scores of 5.4 (7 = *guided by participant*) for Kaylie and 5.0 for Maya indicated that these two participants had a slightly greater role in guiding interactions than did their partners.

### Social Validation Measures

Social validation measures (Wolf, 1978) were collected to assess the importance and acceptability of program goals, procedures, and outcomes. Prior to collecting data, we queried participants about their social goals (e.g., "Would you like to have more friends at school?" and "Would you like to have more friends in \_\_\_\_ class?"). We then asked participants at the conclusion of the study whether they believed they achieved their goals and whether their books had helped them talk to new friends. Participants' responses to pre- and post-intervention interview questions addressing their social goals are reported in Table 2. During pre-intervention interviews, participants generally indicated that they would like to have more friends in school, at lunch, or when they go to their classes, with rare exceptions (e.g., Jordan said, "No thanks" in response to wanting more friends in class). All participants responded affirmatively during post-intervention interviews that they had more friends in their classes and at lunch, often identifying



**Table 2.** Participants' Social Goals.

Participant	Preintervention question	Postintervention question
	Would you like to have more friends at school?	Do you have more friends at school now?
Harold	Nodded "yes."	"Yeah." (Smiles)
Jordan	"Yes."	"I have more friends."
Kaylie	"Yes, I would like to have more friends."	"I think I do."
Brittany	"I don't know . . ."	"Yes . . ."
Maya	"Yes."	"Yes."
Hugh	"I'm kind of okay with this."	(Pointed to 3 friends at lunch) "It's easier to talk with the friends I have normally."
	Would you like to have more friends at lunch?	Do you have more friends to talk with at lunch now who are from your other classes?
Harold	Nodded "yes."	"Yeah. A____, K____, O____."
Jordan	"Yes ma'm."	"I have more friends."
Kaylie	"Gosh, well, yes."	"Well, yeah."
Brittany	"At least one more."	"I talk to S____, E____, A____, S____."
Maya	"Yes."	"Yes. Like K____, C____, and M____."
Hugh	"All the friends I have are at lunch."	"Yeah, all my friends are from other classes."
	Would you like to have more friends when you go to different classes? What would you like to do with them?	Do you have more friends now when you go to other classes? What do you do with them?
Harold	"Yes. Help them when they're confused and they'll help me when I'm confused."	"When I go to Spanish. We just talk. I like to ask them what is your favorite movie or I like to ask them what are your plans for the weekends."
Jordan	"No thanks."	"Spanish, photography, I work with them."
Kaylie	"I try to mingle here but it's kind of hard . . . If I don't really know them that well, it's hard for me to talk to them."	"I don't know. I just talk to people. I just put myself out there."
Brittany	"Um, yeah. Just eat with them and be nice to them."	"M____ in my psych class. We just discuss certain things or sit together."
Maya	"Yes. Talk to them."	"In Spanish, yes, talk Spanish and learn new things. In US history, just talk. In business management, I talk to two people: P____ and B____."
Hugh	"I have one or two. You're supposed to be quiet and not talk in class."	"Yeah, I have more."
	How do you feel when you meet someone new?	How do you feel when you talk to your new friends?
Harold	"Just go over there and walk with them. It will be fine."	"I feel excited when I talk to my new friends."
Jordan	"Good."	"I feel okay."
Kaylie	"If I'm with someone I know well I can talk to them but if I don't, it's hard to talk with them."	"When I meet new people I'm sort of nervous."
Brittany	"Weird for a little while."	"Like I don't trust nobody sometimes, but I don't do it when I'm using the cards."
Maya	"Happy sometimes, scared, or worried."	"More happy."
Hugh	"If I was working I'd help them out. If I was too busy I might be rude, but I don't mean to."	"Normal."
	Tell me some things you could do to have more friends at school.	Does your book help you talk to your new friends now?
Harold	"I'm not sure."	Nodded "yes"
Jordan	"Work as partners, sit together at stadium on pep rally days. Eat and sit together at lunch."	"Definitely. Yes, sir."
Kaylie	"If I'm with someone I know well I can talk to them but if I don't, it's hard to talk with them. I could certainly talk to people more, mingle more."	"It helps me get started."
Brittany	"Just be nice and don't hurt people and don't hit, stay out of trouble, ask them how they feel, maybe have them write about themselves, email them."	"Yes and no. [The communication book is] better if I know that person."
Maya	"Say 'hi,' be polite, don't be scared, like, don't be nervous."	"Yes."
Hugh	"I don't know. I meet new people by association."	"It helps me because I can remember stuff with it."

**Table 3.** Partner and Participant Perceptions.

Participant (no. partners, participant ratings)	Did you enjoy this interaction?		Would you like to have this kind of interaction again?		Do you think your partner enjoyed this interaction?		When you are with your friends do you have similar interactions?		Did you feel that your partner interacted with you appropriately?		Overall M	
	PTN	PTP	PTN	PTP	PTN	PTP	PTN	PTP	PTN	PTP	PTN	PTP
Harold (12, 4)	4.8 (4–5)	3.8 (3–5)	4.9 (4–5)	4.3 (3–5)	4.6 (3–5)	4.3 (4–5)	4.4 (4–5)	4.3 (3–5)	4.5 (4–5)		4.6	4.2
Jordan (13, 3)	4.7 (4–5)	3.8 (3–5)	4.5 (3–5)	4.0 (4)	4.2 (3–5)	4.3 (4–5)	4.2 (2–5)	3.7 (3–4)	4.8 (4–5)		4.5	4.0
Kaylie (7, 3)	4.9 (4–5)	4.7 (4–5)	4.9 (4–5)	4.3 (3–5)	4.9 (4–5)	4.3 (3–5)	4.4 (4–5)	4.0 (4)	5.0 (5)		4.8	4.3
Brittany (9, 4)	4.4 (3–5)	3.5 (3–5)	4.7 (3–5)	2.7 (2–4)	3.7 (1–5)	3.3 (3–4)	3.9 (2–5)	2.0 (1–3)	4.4 (3–5)		4.2	2.9
Maya (7, 5)	4.4 (4–5)	4.3 (3.5–5)	4.3 (4–5)	4.6 (4–5)	4.0 (3–5)	4.4 (4–5)	4.1 (3–5)	4.8 (4–5)	4.4 (4–5)		4.2	4.5
Hugh (7, 5)	4.7 (4–5)	4.2 (3–5)	4.3 (4–5)	4.4 (3–5)	4.1 (3–5)	3.4 (2–4)	4.2 (3–5)	2.2 (2–3)	4.9 (4–5)		4.4	3.6
Overall M	4.7	4.0	4.6	4.0	4.3	4.0	4.2	3.5	4.7		4.5	3.9

Note. PTN = partner; PTP = participant. Values are presented as mean (range) unless indicated otherwise. Ratings on a scale of 1 (*not at all, never*) to 5 (*a lot, yes*).

general education peers who had served as conversational partners as their friends. Participants also indicated that the communication book helped them talk to peers (e.g., “It helps me because I can remember stuff with it”).

Following approximately 25% of communication book sessions (range = 16%–38%), participants completed a questionnaire evaluating their interactions with their conversational partners (see Table 3). Questionnaires were composed of four items rated on a 5-point Likert-type scale from 1 (*least favorable*) to 5 (*most favorable*). Mean response ( $n = 24$ ) across all items and questionnaires was 3.8 (range = 1–5), indicating that participants *so-so* or *pretty much* enjoyed their interactions. Participants’ responses were more variable than those of partners; for example, Brittany rated interactions lower than did all other participants ( $M = 2.9$ , range = 1–5).

Following approximately half of communication book use sessions (range = 47%–68%), conversational partners were asked to complete written questionnaires in which they evaluated their interactions with participants. Partner questionnaires were composed of five items rated on a 5-point Likert-type scale from 1 (*least favorable*) to 5 (*most favorable*). Mean response across all items and questionnaires ( $n = 55$ ) was 4.5 (range = 1–5; see Table 3), suggesting that conversational partners generally viewed the interactions favorably.

Conversational partners who had three or more interactions with a participant completed post-intervention questionnaires to assess their perceptions of the effectiveness of the communication book (see Table 4). Each questionnaire was composed of six questions rated on a 5-point Likert-type scale from (1) *strongly disagree* to (5) *strongly agree*. Mean response across all items and questionnaires was 4.1 (range = 1–5), suggesting that conversational partners generally agreed that the communication books helped participants to increase their conversational interaction.

Because a normative range of opportunity for and occurrence of social interaction among students in

general education academic high school classes has not been established in the literature, we observed 150 random dyads of students under baseline conditions using the same outcome measures applied to participants. We collected data during fifteen 5-min observational sessions in each of 10 general education academic classes attended by participants (e.g., algebra, biology, Spanish) for a total of 150 observations (11.25 hr). Of the 300 students observed, 202 were Black, 75 White, and 23 Hispanic or other ethnicities; 156 (52%) were females. During regularly occurring opportunities to interact, dyads averaged 49% of time interacting versus only 13% of time when low opportunities existed (e.g., when taking a test or attending to a class lecture).

## Discussion

Self-prompted communication book use taught by a peer with a learning disability and in combination with conversational partner orientation was effective at increasing conversational interactions of six high school students with autism or autistic-like behavior with their peers without disabilities. This study expanded Hughes et al. (2011) by applying communication book use to a broader population of students with disabilities with more extensive verbal skills who attended at least two academic versus elective-only general education classes. Increased interaction during the communication book use condition was associated with participants reporting having more friends at school and feeling that the communication book helped them talk to peers. Feedback from conversational partners without disabilities suggested the effectiveness and acceptability of communication books.

This study extends the literature on social skills instruction among high school students with autism in several ways. First, students were taught to look at their books (or touch the Braille sentence on the first card in their books), ask the question on the first card, converse with their conversational partner, turn to the next card when the exchange

**Table 4.** Postintervention Partner Responses.

Participant	_____ is initiating more conversation now (M)	_____ responds more now when I talk to him/her (M)	_____ talks to me more now (M)	_____’s picture book helps him/her talk more (M)	I like talking to _____ more now (M)	The picture book works well to help _____ talk more (M)
Harold	4.5	5	4.5	4.0	5.0	4.5
Representative comment	“His conversation skills improved a fair amount during this. But I think he can do better.”					
Jordan	4.5	4.5	4.5	3.0	4.0	3.5
Representative comment	“Jordan has regular conversations all of the time. He approaches me daily, almost, to talk.”					
Kaylie	4.0	3.5	3.5	4.5	4.0	4.5
Representative comment	“I think the books helped Kaylie a lot and I can tell she enjoys talking with them.”					
Brittany	4.0	4.5	3.5	3.0	3.5	3.5
Representative comment	“Brittany was always very good at what to talk about, she’s just not as shy now.”					
Maya	4.5	4.5	5.0	3.0	5.0	3.5
Representative comment	“I think she became more friendly. Every time she sees me in the hall she talks to me now. She has become more comfortable with others.”					
Hugh	4.0	3.5	4.0	3.5	3.5	4.5
Representative comment	“Can see a big difference from the first time. Good job.”					

Note. Each participant was rated by three partners. Ratings on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*).

ended, and ask the next question. The self-directed component of this strategy may have accounted for its success in maintaining conversational interaction among multiple familiar and unfamiliar general education peers and over time (up to 8 months following withdrawal of daily communication book use during the following school year). On the other hand, it could be argued that the communication book alone served as a permanent prompt for participants’ conversational interaction. For example, Davis et al. (2010) instructed students to use a permanent picture prompt (i.e., “Power Card”) to promote their use of conversational skills with general education classmates. However, students in the Davis et al. study were not taught an interactive strategy by which to use the card when conversing, which may relate to the limited generalization reported by Davis and colleagues. The self-prompting sequence taught in conjunction with communication books in our study may have contributed to generalized conversational skills observed across participants.

Second, we easily adapted communication books to meet the broad range of participant’s skills and needs. Previously, researchers examining communication books (e.g., Hughes et al., 2011; Hunt et al., 1990) used cards with printed questions and corresponding pictures to prompt question-asking among students with limited verbal and reading skills. Students in the present study had a much wider range of verbal and reading skills, which we accommodated by adapting books for individual participants.

Hugh, Kaylie, and Brittany had no intellectual disability and demonstrated verbal and reading skills similar to their classmates in general education. Pictures were not required to prompt question-asking for these students, although Kaylie’s and Brittany’s cards were adapted by imprinting Braille questions on them. Harold, Jordan, and Maya had mild intellectual disability and more limited reading skills. These students used communication books similar to those introduced by Hughes et al. (2011) with pictures and words to accommodate their reading levels. The low-cost modifications of the communication books while retaining their effectiveness provided evidence of the practicality and adaptability of communication book use across a range of students with autism and additional disabilities, including intellectual disability, attention-deficit/hyperactivity disorder (ADHD), and blindness.

Third, all participants in our study attended some (range = 2–7) academic general education classes, as compared with participants in previous studies of communication book use among high school students with autism who attended elective-only general education classes (e.g., physical education, art, keyboarding; Hughes et al., 2011). Readers may question whether use of a communication book in an academic general education class would be stigmatizing, particularly since participants in our study did not have obvious disabilities that would appear to impair their verbal communication skills. Interestingly, our social validation findings suggest that communication books were

acceptable to peers without disabilities in lunch settings and academic classes. Partners reported that conversations augmented with communication books were similar to those they had with their friends in general education. After an interaction with Harold, one peer reported, "It was like a regular conversation." In response to the question "When you are with your friends do you have similar interactions?" conversational partners' ratings averaged 4.2 of a possible 5.0 (i.e., *pretty much*; see Table 3). In addition, in a post-intervention questionnaire, one of Jordan's partners commented that "Jordan has regular conversations all of the time. He approaches me daily, almost, to talk" (see Table 4).

It may be that because communication books were effective at increasing participants' conversation with classmates with whom they had previously conversed only rarely, peers overlooked the novelty of a communication book in class. For example, one of Kaylie's conversational partners commented, "I think that the books help Kaylie a lot and I can tell she enjoys talking with them" (Table 4). Alternately, it may be that conversational partners realized that participants needed a communication aid to engage in interactions and, therefore, they accepted its use. The particular high school that students attended had a fair number of students with vision, hearing, and physical impairments who attended academic general education classes, which may have promoted acceptance of prosthetic and communication devices. Furthermore, participants appeared to become increasingly comfortable with their communication books, even offering explanations to peers about their purpose, which may have served to assuage peers' concerns or discomfort. For example, Hugh told a peer that "these cards are a little unusual but they help me improve my conversations." Jordan reported post-intervention, "It was like showing [the book] and talking with friends, like hanging out with them." General education teachers also anecdotally reported that when participants used their books, they initiated more in class and seemed to feel more comfortable and confident among their peers (e.g., "Harold is opening up more now with his peers when he uses his book").

Fourth, a novel feature of our study was that a special education peer with a learning disability effectively taught participants to use communication books. Prior to communication book use instruction, a researcher taught the peer to follow a training script (Hughes et al., 2011), which had been adapted by simplifying wording and using large print to accommodate the peer's reading skills. The fact that the peer was familiar with participants and, following training sessions, verbally shared his own experiences in learning to speak up with classmates may have added to the effectiveness of the peer training. Researchers have suggested that students are more likely to imitate the behavior of and learn from peers whom they view as having similar attributes (Braaksma, Rijlaarsdam, & van den Bergh, 2002). However, rarely in published studies have high school

students with disabilities served as teachers to their peers (see Agran, Fodor-Davis, Moore, & Martella, 1992, as a rare exception). We support expanding the instructional role of students with disabilities with their classmates.

Fifth, participants' conversations with their partners in general education were found to approximate those of general education dyads whom we observed as a normative comparison in academic classroom settings. Although participants and partners interacted approximately twice as much as the normative comparison (98% [range = 73%–100%] vs. 50% [range = 3%–97%] of intervals during 5-min sessions with regularly occurring opportunities, respectively), the expectation during communication book use was engaging strictly in conversation versus performing academically. Without communication books during baseline, however, participants conversed with peers during a mean of only 1.9% of intervals per 5-min session. Therefore, during communication book use, participants' interactions more closely approximated the range of interaction of their peers without disabilities. Additional similarities were that mean affect ratings (4.0) for general education peers in the normative comparison group and for participants (4.1) and partners (4.5) during communication book use all fell in the area of *inviting of interaction*. These findings are important because if interventionists want to promote social interactions that are functional within an environment, it is critical that they are similar to a normative range of expected behavior within the immediate social context (Siperstein, Parker, Norins Bardon, & Widaman, 2007).

### Limitations and Future Research

Limitations of the study suggest directions for future research and practice. First, researchers "set-up" conversations during communication book use by pairing members of the conversational dyad and selecting the time and place where they would interact. Although this pairing was a component of the intervention package as was conversational partner orientation, the researcher role may have caused conversations to be less naturalistic (Hughes et al., 2011). Previous researchers have found that without social programming to promote interaction, few conversations are likely to occur between students with disabilities and their general education peers (Carter et al., 2005). As demonstrated in this study, during baseline, interactions rarely occurred between participants and their peers in general education despite being in proximity in class. It is likely that having teachers or staff who are members of the school community promote social interaction would be less stigmatizing than involving researchers. In addition, with support of teachers or inclusion specialists, peers also have been effective facilitators of interaction with classmates with autism and related disabilities (e.g., Haring & Breen, 1992). Future researchers should investigate whether adult

support can be lessened as peers are encouraged to initiate and maintain interactions with students with disabilities.

Second, we failed to measure generalization of communication book use when conversational opportunities were not introduced by researchers. It may be that participants would have initiated conversation with peers had their communication books been available throughout the day. Future researchers should allow communication books to be available to students throughout the school day when researchers are not present. Peers in general education, paraprofessionals, or the participants themselves could be taught a simple data recording or self-monitoring system to record conversations that occur throughout the day.

Third, communication books contained a limited number of topics. Although conversational openers comprising communication books were socially validated and drawn from a pool of topics suggested by general education peers at the high school (Hughes et al., 2011), some partners and participants mentioned redundancy of topics. For example, after interacting with Maya, one peer commented that “the questions are all the same.” Similarly, one of Hugh’s partners suggested “maybe he could open up a little more, try to get deeper into the conversations.” Future interventionists should teach participants to expand beyond topics written on the cards, such as by asking novel or follow-up questions based on peer responses.

Fourth, because communication book use was introduced as a package in combination with conversational partner orientation, it is not possible to separate out the effects of each component of the intervention package. It may be, for example, that the communication book itself was not a critical component of the intervention and that participants and peers would have interacted together if just a simple directive to converse were provided. However, prebaseline and baseline data revealed few interactions of participants with any peers even when in proximity without the use of a communication book. Future researchers could conduct a component analysis of the intervention by systematically taking data on conversations between participants and partners when the communication book is or is not available and a directive to interact is provided.

Finally, although we addressed social behaviors associated with verbal students with autism, such as limited conversational topic repertoires (e.g., Bock, 2007; Davis et al., 2010), we failed to consider additional related behaviors, such as stereotypy (Loftin, Odom, & Lantz, 2008; Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002). Engaging in stereotypic behavior can be socially stigmatizing, particularly on the high school level, serving to further increase social isolation (Loftin et al., 2008). During baseline, Harold, Kaylie, Maya, and Hugh were observed to engage in repetitive stereotypic behavior, including hand and finger

movements, eye rubbing, verbal stereotypy, repetitive handling of objects, and skin picking. While it was anecdotally observed that rates of repetitive stereotypic behaviors decreased for participants during communication book use, no systematic data were collected. Intervention strategies have been investigated to decrease stereotypy, including teaching individuals to engage in incompatible behavior or using incompatible manipulatives (Loftin et al., 2008; Nuzzolo-Gomez et al., 2002). In the future, researchers should investigate whether self-prompted communication books can serve as an incompatible manipulative for stereotypic repetitive behaviors.

## Conclusion

Similar to their peers with more severe disabilities, verbal students with autism or autistic-like behavior and related disorders such as anxiety are often socially isolated and face challenges in socializing appropriately with their peers in general education (White et al., 2010). These challenges are exacerbated when such students enter high school where conversation is the expected vehicle for interacting with teachers and peers (Hendricks & Wehman, 2009). We applied the use of self-prompted communication books (e.g., Hughes et al., 2011) in combination with conversational partner orientation to new populations: verbal high school students with autism and no cognitive impairments and students with autism or autistic-like behavior and mild intellectual disability or blindness. Interactions between participants and their general education peers were similar to those of a normative comparison group. The communication books were low-cost and adaptable; their use was viewed by participants, peers, and teachers as socially acceptable in both lunch settings and academic general education classes.

To date, however, the communication book package has been introduced only during researcher-contrived social interaction opportunities. An assessment of its durable educational value will require assessment of student interaction under more naturalistic and extended periods of time. It may be, for example, that communication books initially may be required to prompt conversation between verbal students with autism and their peers without disabilities but that, over time, students may be able to maintain extended conversations with peers without such aids when opportunities to interact in school are provided. The role of the peer and peer characteristics most likely to prompt conversational behavior also should be examined as researchers and educators aim to identify factors associated with increasing social interaction and acceptance of verbal students with autism in their general education high school classes and throughout their day at school.

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