A Peer-Delivered Social Interaction Intervention for High School Students With Autism

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Limited social interaction typically occurs between high school students with autism and their general education peers unless programming is introduced to promote interaction. However, few published social interaction interventions have been conducted among high school students with autism and their general education classmates. Such studies typically have involved considerable researcher assistance in arranging and supporting opportunities for interaction. This study represents a departure from previous interventions by teaching general education students a strategy to prompt themselves to increase their interactions with classmates with autism. Three general education high school students were taught to set interaction goals and monitor their interactions with a peer with autism in their classes. The goal-setting package was associated with increased social interaction among participating students. Based on findings, recommendations are provided for future research and practice.

DESCRIPTORS: autism, goal setting, high school students, peer assistance, self-monitoring, social interaction

Despite the Individuals With Disabilities Education Act of 2004 and related legislation mandating access to general education for students with disabilities to the maximum extent possible, inclusion and membership in general education settings remain limited for students with autism—particularly at the high school level (U.S. Department of Education, 2010). Research indicates that many of these youth spend their school days socially isolated from their peers without disabilities, even when they are physically included in classes or other school activities (Newman, 2007). Consequently, instructional staff typically must assume responsibility for ensuring frequent, ongoing interaction between students with autism and their peers, if it is to occur at all (Carter, Hughes, Guth, & Copeland, 2005).

Having school or research staff provide the occasion or prompt for social interaction to occur, however, may restrict interactions to adult-directed opportunities (Hughes, Carter, Hughes, Bradford, & Copeland, 2002). For example, Hughes et al. (2002) found that an adult-delivered instruction to socially interact with students with intellectual disability was required for even experienced peer “buddies” who met daily with these students. Although students in peer-delivered interventions are expected to actively promote interaction with classmates with autism, considerable adult assistance typically is provided throughout the intervention condition. For example, peer-mediated interventions conducted in preschool or elementary school settings routinely have incorporated adult assistance, as illustrated in the following examples. Goldstein, Kaczmarek, Pennington, and Shafer (1992) taught typically developing preschoolers to facilitate interaction with five classmates with autism. Although peers did increase their use of social interaction strategies, adults provided prompts, praise, and token reinforcement throughout the intervention condition. Similarly, Kasari, Rotheram-Fuller, Locke, and Gulsrud (2012) taught small groups of general education elementary school students strategies to use to engage classmates with autism in social interaction during recess on the playground. Peers met twice weekly with an adult to practice social engagement strategies. Adults provided assignments to practice strategies as well as reinforcement for interacting with classmates with autism.

Peer support interventions introduced in middle or high schools in which general education students support classmates with developmental disabilities to increase their social interaction and academic engagement also have incorporated adult assistance (e.g., Carter, Moss, Hoffman, Chung, & Sisco, 2011). Peers typically are (a) taught strategies to adapt class assignments, provide instructional and behavioral support, and promote communicative interaction of students with disabilities and (b) provided supervision and assistance from classroom teachers or paraprofessionals. For example, paraprofessionals in Shukla, Kennedy, and Cushing (1999) taught general education
peers to provide social, academic, and behavioral support to three middle school students with intellectual disability. Paraprofessionals monitored and commented on peer support activities on average every 10 min, provided assistance to peers as needed, and gave peers daily performance feedback throughout the intervention condition. Carter, Sisco, Melekoglu, and Kukowski (2007) taught general education peers to support social and communicative interaction and class participation of four students with intellectual disability. Paraprofessionals assisted peers, as needed, throughout the intervention condition by facilitating interaction between students and peers and providing periodic performance feedback.

Teaching general education peers to set their own goals to increase their social interactions with classmates with autism rather than having a teacher provide a prompt, however, may increase the likelihood that interaction will occur throughout the class period and during occasions when general education students typically interact with other classmates, such as transitions or downtimes (Locke & Latham, 2002). Further, teaching students to guide their own social interaction behavior removes the stigma of dependence on adults assisting students in general education settings (Carter & Kennedy, 2006; Carter et al., 2011) and increases the likelihood that such behavior will generalize across people, settings, and time (Stokes & Baer, 1977; Wehmeyer et al., 2007).

Researchers have incorporated use of self-management techniques by general education students in several peer-mediated social interaction studies with young children, although within a paradigm of considerable instructional support (e.g., Sainato, Goldstein, & Strain, 1992; Thiemann & Goldstein, 2004). For example, Thiemann and Goldstein (2004) taught elementary school general education students to prompt interactions with classmates with pervasive developmental disorder (PDD). Subsequently, peers and students with PDD participated in researcher-delivered training sessions in which they set goals for how many trained social skills they would generalize on average every 10 min, provided peers daily performance feedback, and monitored and commented on peer social interaction and class participation. Paraprofessionals assisted peers, as needed, throughout the intervention condition by facilitating interaction between students and peers and providing periodic performance feedback.

This study was designed to increase sustained, peer-directed social interaction between high school general education students in inclusive, elective classes and their classmates with autism by teaching the general education students to set social interaction goals and monitor goal attainment. In addition, suggestions for socially interacting specific to each participating student with autism were provided to general education students prior to implementing the social interaction intervention. The decision of when and how to interact with classmates with autism was made solely by the participating general education students; this decision was a novel feature of the intervention. Research question addressed were as follows: (a) Will a package that combines individual training of general education students on goal-setting, self-monitoring, and suggestions for socially interacting promote sustained social interaction between a general education student and a student with autism in an inclusive high school classroom? (b) What features of the intervention or student characteristics may affect occurrence of social interaction within the classroom setting? (c) How will contextual features of the school and classroom environment (e.g., class activities, teacher instruction, seating arrangements) affect opportunities for interaction?

Method

Participants and Settings
Participants attended an urban public high school in southeastern United States. There were approximately 1,100 students (56% Black, 37% White, 4% Hispanic, and 3% Asian and other ethnicities) in grades 9 through 12 enrolled in the school. Forty-six percent of students qualified for free or reduced lunches, and 15% of students received special education services. Data were collected in three inclusive elective classroom settings—one for each of three participating special education students. All classes were on a 90-min block schedule and met every other day.

Special education students (i.e., “participants”) and targeted settings
Three special education students were selected to participate in the study based on the following criteria: (a) a diagnosis of autism, (b) teacher-identified need for the student to increase social interaction, (c) parental consent for the student to participate, (d) enrollment in at least two general education elective classes, (e) a participant-stated goal of having more friends at school and assent to participate, and (f) low rates of participant social interaction with general education classmates during a 3-week prebaseline observation in general education classes. (These students are referred to as “participants” throughout the study.) Prebaseline descriptions of participants and the inclusive class setting chosen for data collection follow.

Damien. Damien was a 16-year-old Black male sophomore with autism whose targeted class was Guitar. He was soft-spoken, rarely initiated or responded to others, and generally displayed a flat affect. Damien typically sat quietly without speaking to students or teachers in class and without interacting with others at lunch. No peers were observed to interact socially with Damien during prebaseline observations in any class. He was fully included in all electives and most academic classes; however, a paraprofessional accompanied him to all classes. During academic classes, the paraprofessional sat next to Damien and...
offered assistance during seatwork. In contrast, the paraprofessional sat behind the class and beyond speaking distance to Damien during Guitar, during which time he was never seen offering assistance to Damien.

Damien’s Guitar class had approximately 30 enrolled students who sat in assigned seating as they received guitar instruction. The majority of class consisted of group instruction, often followed by individual or paired practice. At the end of class, students were allowed to leave their seats and socialize during the last 15 min. Damien was expected to engage in all assigned class activities without paraprofessional support.

Gwen. Gwen was a 17-year-old White female junior with autism and severe intellectual disability whose targeted class was Art. She had a limited verbal repertoire, responding “yes” to questions or repeating with a whispery voice the last word spoken to her by adults. Gwen often smiled and gazed at others but did not otherwise initiate interactions, except for occasionally approaching classmates or adults and “sniffing” their hair or clothes. In addition, she often rocked backwards or forwards and flapped her hands in a stereotypical manner. Although peers often greeted her at school, Gwen typically failed to respond without prompting by an adult. Gwen was fully included in all elective but no academic classes. She received considerable paraprofessional assistance throughout the day to perform classroom procedures, which were also substantially modified for her. During prebaseline, the paraprofessional remained in proximity to Gwen during all classes; during intervention in Art, the paraprofessional supervised Gwen from behind but within speaking distance if assistance was needed.

Gwen was enrolled in an advanced Art class of approximately 25 students. During most of the class period, students worked independently on their art projects with no assigned seating, occasionally talking quietly to each other and moving, as needed, to gather or return art supplies. Approximately weekly, students and the instructor orally critiqued the class’s displayed artwork or watched an art documentary. Gwen typically was not present during these occasions and generally attended the class, at most, for 45 min of the 90-min class. Periodically, the Art teacher would comment on and critique Gwen’s work. Gwen, who had had several years of private art therapy, typically engaged readily in her own painting or drawing projects in class with assistance of her paraprofessional to gather, put away, and monitor use of art supplies, as needed.

Henry. Henry was a 17-year-old White male junior with autism and mild intellectual disability. His targeted class was physical education (PE). Henry’s initiations to peers were infrequent and appeared awkward. Henry spoke softly but with a high-pitched vocal tone. He responded when peers spoke directly to him but seldom initiated. Henry occasionally spoke with adults about topics of interest (e.g., cartoons or movies). During free time he often stood near other groups of students, observing them but saying nothing. He occasionally displayed stereotypical gestures, such as repeatedly folding and unfolding his arms, and talking quietly to himself from the corner of his mouth. Henry was fully included in all elective but no academic classes. He received no paraprofessional assistance during any class.

Henry’s PE class occurred in the school gymnasium, which contained a full-size basketball court, bleachers, and six basketball goals. Approximately 40–50 students attended the class, which generally adhered to the following format: After initial calisthenics, the PE teacher occasionally involved students in a class-wide game, such as kickball or a basketball competition. Afterwards, students were allowed to play ball games or exercise on their own while others socialized, often sitting on the floor against the gymnasium wall. During baseline in his class, Henry generally shot baskets by himself during free time. He was expected to follow the same format as all students in the class (see Table 1 for additional participant characteristics.)

General education students (i.e., “partners”).
Three male general education students (2 Black, 1 White) were selected to participate in the intervention. Each was chosen as a social interaction partner to one of the participants. (These students are referred to as “partners” throughout the study.) Selection criteria included having (a) a shared general education elective class with a participant; (b) recommendation and approval of the elective teacher; (c) assent from the student, including an expressed willingness to interact with the participant; and (d) a verbal agreement to monitor and record interactions with the participating student during class time. Teachers were asked to nominate potential partners based on a student’s history of helping and showing interest in classmates and likelihood of wanting to interact with special education students. No history of interacting with special education students nor particular level of academic standing was required nor was this information sought.

Quincy. Quincy was a musically talented Black male senior who sat directly in front of Damien in his Guitar class. He was recommended by the teacher because of his pro-social behaviors toward classmates and social interaction with students during free time in class. Prior to the intervention, the Guitar teacher had occasionally asked Quincy to help fellow students with class work.

Adam. Adam was a Black male senior who shared an Art class with Gwen. He was a popular, friendly student on the school’s football team. Adam was recommended by both the art teacher and Gwen’s special education teacher because of Adam’s and Gwen’s common interest in painting and because of Adam’s friendly attitude. In addition, the teachers reported that Adam occasionally voluntarily greeted or interacted with other students from Gwen’s class.
<table>
<thead>
<tr>
<th>Participant</th>
<th>Diagnosis/IQ</th>
<th>Adaptive behavior assessment</th>
<th>Speech/language assessment</th>
<th>Medical/behavioral history</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damien, 16,</td>
<td>Autism, 33a (mild to moderate ASD)</td>
<td>Communication Parent = 7 Teacher = 8 Social Parent = 9 Teacher = 11 Total Parent = 35 Teacher = 10f</td>
<td>83 [7 percentile], 50, 60d</td>
<td>History of speech/language disorder</td>
<td>None reported</td>
</tr>
<tr>
<td>Black male</td>
<td>IQ = 84e</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gwen, 17,</td>
<td>Autism, 43.5a (severe ASD)</td>
<td>Communication = 64</td>
<td>57, 63b</td>
<td>History of behavioral services for self-injurious behavior and noncompliance</td>
<td>Strattera for ADHD, Klonopin for seizures</td>
</tr>
<tr>
<td>White female</td>
<td>intellectual disability</td>
<td>Socialization = 64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Henry, 17,</td>
<td>Autism, 76, 37a (severe ASD)</td>
<td>Communication = 1</td>
<td>33 [&lt;1 percentile]b</td>
<td>History of significant communication impairment, historical diagnosis of PDD-NOS, history of social skills deficits</td>
<td>Clonidine for ADHDj</td>
</tr>
<tr>
<td>White male</td>
<td>IQ =60 l</td>
<td>Social = 2 General Adaptive Composite = 76m</td>
<td></td>
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</table>

Franklin

Franklin was a White male sophomore in Henry’s PE class. Franklin usually spent time talking or playing basketball with a small group of friends in class during free time activities. Occasionally Henry stood near Franklin and his friends, although they were never observed to acknowledge Henry. The PE teachers recommended Franklin because of his friendly and cooperative demeanor.

General education teachers

The only selection criterion for participating general education teachers was their willingness to house the social interaction intervention in their classroom. The role of general education teachers of the three targeted inclusive elective classes was limited to recommending a social interaction partner for the special education participant in their respective class. Teachers were not asked to interact with participants or partners differently than they did with any other students in the class during baseline or intervention sessions.

Outcome Measures

Two measures were assessed throughout the entire study during both baseline and social interaction intervention conditions:

(a) Frequency of initiation. An initiation was defined as verbal or nonverbal behavior produced by a partner directed toward a participant (or vice versa), preceded by at least 8 s without communication, for the purpose of (a) beginning a joint activity, (b) beginning or maintaining a conversation, or (c) conversing during an ongoing joint activity (Fey, 1986; Hughes et al., 2011). For example, when practicing guitars together in class, Quincy could say, “let’s try playing this chord next” to Damien. In Art class, Adam could say, “Hi, Gwen. Let’s paint over here today.” When shooting baskets together in PE class, Franklin could motion Henry to wait for him to get the rebound. Nonexamples included Damien passing a class handout to Quincy without verbally communicating, Gwen touching Adam’s backpack or art supplies, and Henry talking when Franklin or no other classmates were within speaking distance.

(b) Duration of interaction. An interaction was defined as an initiation that was subsequently acknowledged by the intended recipient (participant or partner) by producing verbal or nonverbal behavior in response to the initiation, such as returning a wave or responding verbally (Fey, 1986; Hughes et al., 2011). For example, Gwen could look and smile at Adam when he said, “Hi, Gwen.” A nonexample could be Damien showing no change in body position or expression when asked, “What page are we on?” by Quincy. Examples of interaction included Quincy and Damien practicing guitar together, Adam and Gwen working on art projects with each other, and Henry and Franklin shooting baskets or talking together. A nonexample included participating in an assigned class-wide activity, such as Henry simultaneously stretching and doing jumping jacks alongside his classmates in PE. The duration of an interaction was scored as one of six intervals of time (e.g., 1–9 s, 10–29 s, 2–5 min) as displayed on the data sheet. A new interaction was scored after 15 s or more elapsed with no interaction between a participant and partner (Haring & Breen, 1992). (Note that initiations could occur within an interaction, such as when Franklin and Henry initiated conversation to each other when shooting baskets together.)

One additional measure, goal setting, was assessed during the social interaction intervention and maintenance conditions only. Goal setting by social interaction partners was defined as (a) recording the number of interactions in which the partner intended to engage with paired participant during the class period, (b) tallying the number of interactions that occurred, (c) recording the total number of interactions, and (d) recording whether the established goal was achieved.

Experimental Design and Conditions

A multiple-baseline design across participants (Kazdin, 1982) with a multi-probe design component (Horner & Baer, 1978) was used to evaluate the effects of the social interaction intervention on partners’ and participants’ social interactions. There were two experimental conditions: (a) baseline and (b) social interaction and goal setting (generalization).

Baseline

We observed partners (Quincy, Adam, Franklin) and participants (Damien, Gwen, Henry) throughout the entire 90-min class periods scheduled for observation. Observers recorded all social interactive behaviors that occurred between the participant and any general education classmate, including the partner. Only partners’ interactive behavior with participants was recorded. No instructions or feedback were provided to any student and the environmental arrangement of the setting was not altered in any way.

Social interaction and goal-setting training

Social interaction and goal-setting training for general education partners was conducted following each pair’s (i.e., partner’s and participant’s) final baseline session. Training began with Quincy, with training for Adam and Franklin following sequentially in a quiet location (e.g., unused classroom) near each partner’s targeted class. (Note that special education participants did not participate in training at any time.) A researcher not serving as observer trained each partner individually during one
training session of approximately 20 min using a written script composed of the following sequence:

First, the researcher explained that she was starting a project at the school to help students who had difficulty talking to others to have more friends. She then explained that the partner had been recommended by his teacher as having good social skills and as someone who could help (participant’s name) to be more included in class activities. The researcher then asked if the partner knew the participant (each did) and described benefits that could occur for both (e.g., get to know new person). Next, the researcher described the partner’s responsibilities, including interacting with the participant daily in class and setting a goal each day for the number of interactions in which the partner intended to engage. The researcher then asked if the partner was interested in helping, to which each responded affirmatively.

The researcher then provided a brief description of the participant’s communication behaviors and personal interests. For example, the trainer said to Quincy, “Damien is a little quiet and shy when first getting to know someone and that he (Quincy) may need to do a lot of the talking at first. However, Damien likes to talk about basketball and he likes Michael Jackson.”

The researcher and partner then discussed possible ways to interact with the participant based on interests they had in common, such as music (Quincy and Damien), painting (Adam and Gwen), or sports (Franklin and Henry). The researcher emphasized, however, that the partner was free to interact with the participant in whatever way he chose or seemed appropriate within the classroom context. Next, the researcher emphasized that the partner should decide himself when it was appropriate to interact with the participant, and not, for example, when he was taking a test, completing class work, or listening to the teacher lecture. Also, the partner should judge how much time he had available during a class to interact, knowing that some days would be busy, leaving little interaction time. The researcher stressed that a good way to judge when to interact would be when he typically would interact with his peers in class.

Finally, the researcher showed the partner an 8½” × 11” binder containing copies of the goal-setting and self-monitoring sheet he should use each day to record his goals and goal attainment. The researcher indicated where the partner should write his goal for the day, emphasizing that the goal should be reasonable and based on the number of times he typically interacted with his classmates. The researcher added that the goal could be changed as needed, depending on the partner’s commitments on a particular day. A definition of “interaction” was not provided to the partner, allowing each to define an interaction himself. Next, the researcher modeled how to tally the total number of interactions that occurred with the participant during class and where to indicate if the partner had met his goal (i.e., met or exceeded the number of expected interactions). Last, together, the researcher and partner brainstormed a location in the classroom for storing the binder before and after class. Partners were told to get their binders and write down their goals when they first saw participants during their next class. Training was then terminated if partners had no questions.

Training occurred during Sessions 7, 18, and 40 for Quincy, Adam, and Franklin, respectively, based on stability in graphed data. No additional trainer assistance was provided throughout the entire study.

**Social interaction and goal setting**

Social interaction and goal setting sessions were conducted identically to baseline sessions with one exception. At the end of each 90-min class period and after the partner had left the classroom, an observer checked the partner’s binder and recorded his written goal and number of interactions recorded. As in baseline, observers continued to record all social interactive behaviors that occurred between the participant and any general education classmate, including the partner, whereas only partners’ interactive behavior with participants was recorded. Also as in baseline, no instructional feedback or environmental modifications were provided.

After an increase in social interaction between Quincy and Damien occurred with regularity (≥10 initiations by Quincy to Damien per session) and to see if goal setting would maintain without the presence of an observer, observers were present in Guitar class approximately every other class day, during which they recorded goal-setting data for both the current and previous day. (Continued variability in frequency of initiations and the encroaching end of school year prevented us from implementing this procedure with Adam and Franklin.)

**Observation and Recording Procedures**

Observers used event recording to record initiations and interactions of the participant with all general education classmates as they occurred, including the initiator, recipient, and time and duration of interaction (e.g., 1–9 s) as displayed on the data sheet. Interactions of the participants with their partners were scored separately from interactions with other classmates. In addition, observers recorded a narrative description of the activity in which the class, participants, and partners were engaged. Because observers did not want to serve as a prompt for participant and partner interactions, they seated themselves in view of but out of earshot of these students, which could be a distance of 30 ft or more in each setting. Therefore, they were unable to record content and quality of verbal interactions.

At the close of each data collection session, observers also recorded partners’ goals and self-recorded interactions as written in their binders. In addition, observers totaled cumulative duration of interaction between the
participant and partner to obtain total minutes interacting. They also calculated percentage of time interacting by dividing total minutes interacting by total minutes participant and partner were present per session.

Observers and Observer Training

Six graduate students in special education served as observers. Prior to data collection, all observers read and discussed behavior code definitions, rules for scoring, and observation procedures. Observers then practiced observation and recording procedures by watching role play models of students interacting, followed by in situ coding. Discrepancies in coding were discussed until agreement was reached. Observers were required to reach a criterion of 80% occurrence interobserver agreement for all outcome measures for at least two consecutive practice sessions before collecting data.

Interobserver Agreement

Interobserver agreement was assessed between 29–50% of baseline and 38–57% of social interaction and goal-setting sessions per participant. The frequency ratio agreement method (Kazdin, 1982) was used to assess percentage occurrence agreement for dependent measures. Overall interobserver agreement means and ranges were: frequency of partner initiations (94%; range = 71–100%), frequency of participant initiations (99%; range = 90–100%), and duration of interaction (96%; range = 76–100%).

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 asked 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?”). At the conclusion of the study, we asked participants if they believed they had achieved their goals. Approximately every fifth self-monitoring sheet listed three questions asking partners to evaluate their interactions with participants. At the end of the study, we also interviewed partners and participating general education teachers by asking open-ended questions to obtain their perspectives on the effectiveness and acceptability of the intervention procedures. Questions asked were derived from previous social interaction studies (e.g., Hughes et al., 2011) and are available on request.

Because we wanted to know how participants’ and partners’ interaction compared to a normative standard for classmates in the intervention class settings, we observed 20 random dyads of students across the three classes using the same outcome measures applied to participants for a total of 20 sessions (12.9 h). Of the 40 students observed, demographic information was recorded for 38, of whom 17 were Black, 16 White, and 5 Hispanic or other ethnicities; 19 (50%) were women.

Fidelity Measures

During training sessions, an observer recorded fidelity of training using an eight-step checklist. Mean training fidelity was 100%.

Results

Generalization Sessions

Frequency of partner initiations

Frequency per session of partner initiations to participants (closed circles) is shown in Figure 1 (upper panels). During baseline, no partner ever initiated to a participant. Following training, partner initiations immediately increased and maintained with variability across partners. Mean frequency of initiations per session during the social interaction and goal-setting condition was 11.3 (range = 5–25) for Quincy, 10.7 (range = 1–26) for Adam, and 5.9 (range = 1–11) for Franklin. (No frequency data appear during sessions when Quincy self-recorded alone following Session 45.)

Frequency of participant initiations

Participants’ initiations to partners were recorded although they were not an intervention target. During baseline, no participant initiated to a partner. Initiations to partners increased variably across participants during the social interaction and goal-setting condition. Damien’s mean frequency of initiating to Quincy increased to 0.2 per session (range = 0–3), Gwen’s mean initiating to Adam increased to 1.4 (range = 0–6), and Henry’s mean initiating to Franklin increased to 5.1 (range = 0–15).

Total minutes and percentage of time spent interacting

Lower panels of Figure 1 display percentage of time (open bars) and total minutes (closed circles) partners and participants spent interacting per session. Quincy and Damien interacted on average 24.9% of time (range = 4.9–67.3%) for a mean of 19.4 min (range = 3.5–58.3 min) per session. Adam and Gwen spent a mean of 41.0% (range = 0.5–100%) of time interacting (M = 16.5 min; range = 0.2–51.0 min). Franklin and Henry averaged 45.1% (range = 12.0–76.9%) of time interacting per session (M = 35.2 min; range = 2.2–70.0 min). (No interaction data appear when Quincy self-recorded alone.)

Normative comparison

Normative comparison data collected in participants’ classes revealed that mean percentage of time participants and partners spent interacting in class was similar to that of general education classmates in each setting. Quincy and Damien interacted a mean of 24.9% of time, which was similar to classmates’ 18.1% (SD = 12.0) of time interacting. Greater mean percentages of time interacting were found for targeted pairs and classmates...
in Art and PE. Adam and Gwen's mean percentage of time interacting was 41.0% (classmates = 54.2%; $SD = 40.2$); Franklin and Henry interacted a mean of 45.1% of time (classmates = 54.9%; $SD = 41.5$).

**Partner goal setting and self-recorded interactions**

Goals set by partners for number of times each intended to interact with participants (open triangles) and self-recorded interactions (open bars) per session are displayed in upper panels on Figure 1. Goal setting and self-recording of interactions began immediately following training for all partners, although level of goals set varied across partners. Mean goals set were 9.5 (range = 6–13), 2.5 (range = 1–4), and 11.5 (range = 7–25) by Quincy, Adam, and Franklin, respectively. Mean self-recorded interactions with participants was 9.7
(range = 1–21) for Quincy, 2.6 (range = 1–4) for Adam, and 9.9 (range = 6–22) for Franklin. Percentage of
sessions in which goals were met or exceeded as determined by partners’ self-recorded interactions was
66.7% (26 of 39 sessions) for Quincy, 85% (17 of 20),
and 79% (15 of 19) for Franklin. Partners accurately
recorded whether or not their goals were met 100% of
the time. (No self-report data appear during six
sessions for Adam and four sessions for Franklin
when self-report binders were not available in respective
classes.)

Variability Across Generalization Sessions
As displayed in Figure 1, frequency of initiating and
time spent interacting varied considerably across and
within partners, which may have related to contextual
differences across classes. Opportunity to interact
generally was more limited in Guitar than in Art or
PE classes. Students were involved in teacher-led group
instruction the majority of class time, in which the
teacher had a no-talking rule while students played
their guitars. Periodically, students were instructed to
practice their guitars in pairs or small groups, allowing
brief opportunities for social interaction. In contrast,
in Art, students primarily worked on individual projects
during which time they were allowed to quietly interact
with their classmates. After group exercises or activity
in PE, students were free to interact in small groups the
rest of class time, either playing basketball or other
games or talking. Relatedly, normative data revealed
that 57% of interactions among general education
students in Guitar were brief (e.g., 1–9 s) compared to
only 20% of interactions in Art or PE. Conversely, no
interactions in the normative sample in Guitar lasted
five or more minutes whereas one fourth of inter-
actions in the normative sample in PE did.

Guitar class
Short but periodic opportunities to interact in
Guitar may explain why Quincy’s mean frequency of
initiating to participant (11.3) was higher than that of
Franklin’s in PE (5.9); however, mean total minutes
interacting in Guitar (19.4) was considerably lower
than that in PE (35.2). Similar to classmates’ inter-
actions, the majority (40%) of interactions between
Quincy and Damien were 1–9 s, however, 12% (vs. 0%
for classmates) were 5 min or more. Furthermore, on
those occasions in Guitar when frequency of initiating and
time spent interacting between Quincy and Damien greatly
exceeded their established mean (e.g., f of initiating =
24 and 25 during Sessions 65 and 87, respectively; see
Figure 1), students worked together in small groups during
the majority of class time. Conversely, frequency of
initiating and time spent interacting were low when
group instruction occurred during the majority of
class time during sessions 28 (f = 5; 6 min) and 30 (f = 5;
6 min).

Art class
Art class typically provided considerable opportunity
for social interaction while students completed individ-
ual projects, as evidenced by 31% of interactions in the
normative sample occurring for 2 min or more. Variability
in interacting between Adam and Gwen in Art appeared
to relate to three factors: (a) weekly teacher-led class
critiquing of student artwork, (b) erratic attendance of
Gwen in class, and (c) Adam’s classwork schedule. First,
a no-talk-out policy was in effect during class critiques
during which time minimal interaction occurred between
any students. For example, during Session 35, Adam ini-
tiated to Gwen only twice for a total of 1 min during
which the class was engaged in critiques for 36 of the
49 min Gwen spent in class.

Second, on average, Gwen attended class for only half
of the 90-min period, and her arrival and departure times
from her special education class were highly unpredict-
able; rarely would she arrive less than 30 min after class
began. For example, during Session 39, Gwen was in
class for only 16 min. Percentage of time interacting with
Adam was high (69%), although they interacted for only
11 min—a pattern typical of dyad interactions in Art, but
not in either Guitar or PE where both dyad members
overwhelmingly were present during the entire class
time (compare lower tiers across settings on Figure 1).
Furthermore, the unpredictability of Gwen’s presence
likely inhibited Adam’s ability to interact with her even
when she was in class. As he reported in a postinter-
vention interview, “I always had a goal [for interacting]
but I never knew how long I would have to interact.”

Third, Adam’s workload varied considerably from
day to day. Direct observation revealed that Adam over-
whelmingly engaged in only three activities in class: in-
dividual artwork, interacting with Gwen, or occasional
classwide participation (e.g., critiquing). However, these
activities were almost entirely mutually exclusive. For
example, on occasion, Adam worked in an auxiliary art
room adjacent to the classroom rarely interacting with
classmates, such as during Sessions 65, 67, and 72. During
each session, he initiated a short greeting to Gwen be-
tween one and three times for a mean total of 1 min per
session. When Adam was not working on art projects,
he interacted almost exclusively with Gwen when she
was present. For example, during Sessions 61, 76, and
80, Adam’s frequency of initiating was 25, 26, and 26,
respectively, versus his mean of 10.7 initiations. Total
time interacting ranged from 23 to 51 min versus a mean
of 16.5 min.

PE class
Mean total time interacting across classes was highest
in PE (35.2 min), likely due to extensive opportunity
typically available to students to interact in small groups
following daily calisthenics. During the few occasions
when opportunity to interact was limited due to classwide
activities, such as fitness tests during Sessions 81 and 85,
little interaction occurred between Franklin and Henry (see Figure 1). Interestingly, although time spent interacting was high for the dyad, mean frequency of initiating (5.9) was lowest across settings. This finding may relate to the type of activity in which the pair typically engaged: basketball. A minimum of one initiation is required for any dyad to engage in a sport such as basketball (e.g., throwing the ball to a partner or saying “Want to shoot baskets?”), although an interaction (e.g., taking turns shooting baskets) could sustain over a lengthy time. For example, the dyad had a single interaction that exceeded 40 min on Sessions 54 (43 min), 73 (57 min), 77 (48 min), and 91 (42 min) and frequently had interactions that exceeded 15 min.

An additional factor influencing partner initiations in PE was an increase in Henry’s initiations to Franklin. Unlike Damien and Gwen, whose initiations to partners showed little increase over time, during later sessions (i.e., 70–93), Henry regularly initiated as frequently as or more than Franklin, somewhat inhibiting Franklin’s rate of initiating while increasing his opportunity to respond. Franklin did initiate at least 10 times during Sessions 50 and 94 when the primary activity was conversation (e.g., talking with a group of students) versus playing basketball and during at least one extended game of basketball (Session 73).

### Social Validation

#### Participants’ social goals

Researchers who did not serve as observers verbally asked participants pre- and postintervention to describe their social interactions and goals. Although all participants provided names of friends at school during preintervention interviews, all indicated they would like to have more. For example, despite citing names of four “friends,” Damien also said, “I don’t know anybody. I only know one person.” When asked postintervention if they had a new friend in class, all participants cited their partners and the actual activities they had engaged in with their partners, such as painting or discussing sports. All responded positively when asked how they felt when hanging out or talking to their new friend (e.g., “I’m not shy about him,” “happy,” “pretty good”).

#### Partners’ perspectives

Partners’ responses to intermittent written questions on their self-monitoring sheets (see Method) are summarized in Table 2. Partners rated the enjoyableness and similarity of their interactions with participants to those with their friends on three items using a 5-point Likert-type scale with poles indicating (1) not at all to (5) a lot.

<table>
<thead>
<tr>
<th>Did you enjoy this interaction?</th>
<th>Do you think your partner enjoyed this interaction?</th>
<th>When you are with your friends, do you have similar interactions?</th>
<th>Overall mean/range</th>
<th>Representative comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quincy (8)*</td>
<td>3.3 (2–4)</td>
<td>3.1 (2–4)</td>
<td>3.3 (2–4)</td>
<td>[It’s going] really good. He’s starting to say things to me first, which has been my goal. At first I was more comfortable, too. It’s just what we [my friends and I] are doing.</td>
</tr>
<tr>
<td>Adam (4)</td>
<td>3.1 (2–4)</td>
<td>5.0 (5)</td>
<td>4.5 (4–5)</td>
<td>When you are with your friends, do you have similar interactions?</td>
</tr>
<tr>
<td>Franklin (4)</td>
<td>3.3 (2–4)</td>
<td>5.0 (5)</td>
<td>4.0 (2–5)</td>
<td></td>
</tr>
<tr>
<td>Overall mean/range</td>
<td>3.8 (4–4)</td>
<td>3.6 (1–5)</td>
<td></td>
<td>Representitive comments</td>
</tr>
</tbody>
</table>

Note. *Number of ratings. Ratings were on a scale of 1 (not at all) to 5 (a lot)."
of Adam or Franklin, perhaps reflecting Damien’s quietness and general lack of affect. Or lower ratings may have related to limited opportunity to interact in Guitar class versus Art or PE.

Postintervention, the researcher who had initially trained partners (but did not serve as an observer) also individually asked partners open-ended interview questions about their interaction experiences. Partners attributed their success in interacting with participants to their overall good attitude and personal skills. Franklin indicated that he did not think all students would have been able to interact as he had. Interestingly, although partners were engaged in a class-related activity (e.g., playing guitar, painting, shooting baskets) with participants much of the time in which they interacted, partners’ responses indicated that they valued getting to know the participant and making friends more than engaging in the activity itself. For example, Quincy stated, “We got to know each other as friends. He got more communicative. Sometimes he would ask me questions about myself.” Adam shared that “the main thing I was trying to do was to be accepted by Gwen. We could have been interacting anywhere. It wasn’t just about painting together.” When asked if they considered participants as “a friend or an acquaintance,” all partners emphatically stated, “as a friend” (e.g., “I think of him just like I think of all my other friends” [Quincy]).

Benefits that partners experienced included making a friend in class (Quincy); being able to “see the world through [Gwen’s] perspective” and getting “to know a broad range of special needs kids” (Adam); and becoming “more patient and understanding” and seeing that, over time, Henry was showing “interest in things I like” (Franklin). Although partners shared challenges they experienced, such as fitting in time to interact in Guitar or Art class, they did not appear to feel stigmatized by interacting with participants in their classes. Quincy shared that “whenever we worked in a group, the other students would be nice to him and would ask him, ‘How you doing?’” Franklin noted “not everyone would want to participate but they thought it was good.” Outside of their targeted classes, Adam mentioned participating in activities with Gwen and her special education class (e.g., digging in the school greenhouse), whereas Quincy and Franklin reported saying “Hi” and talking with participants when seeing them in the halls.

**Teachers’ perspectives**

Postintervention, participating general education teachers (i.e., Guitar, Art, and PE teachers) were also interviewed by an observer in an open-ended question format about their views of the effectiveness of the social interaction intervention. All teachers reported that the intervention had positive effects on both participants and partners. For example, the Guitar teacher said, “It was beneficial. Quincy and Damien interacted every time they were in class. I thought Quincy included Damien really well and ultimately it included interactions with others. And Quincy was able understand how different people interact.” The PE teacher remarked that, “Gwen now feels she has a companion and a friend. The program made her life richer, which is beneficial for everyone. I think Adam has expanded his ideas about how diverse individuals can be beyond the ‘disability.’” In addition, this teacher suggested that, through the program, “Adam expanded his ideas about what ‘good art’ is.” The PE teacher observed that, “the program is great. Special education students socialize more with peers than with an aide. And it gives the peers added responsibility and empathy to look at the world in a different way.” Teachers indicated that the program worked well within the individualized structure of their classes. For example, the Art teacher suggested that because the Art class was advanced, students typically worked on their own, which “gave Adam the freedom to interact with Gwen in a different way than if he had only five minutes at a time. I think the interaction became more authentic and he became more creative with his interactions with Gwen.” The Guitar teacher’s comments concurred when she indicated “making music is by nature social so the program went well. It might be more difficult in more academic classes like Music Theory where there’s not much room for interaction.” In addition, all teachers indicated that they would be interested in pairing students in future classes. Considerations included (a) likely needing assistance from a special education teacher, (b) possibly incorporating peer interaction into individual students’ coursework, and (c) carefully matching the unique characteristics of students in the pair.

**Discussion**

Individual training of three general education high school students that combined goal setting, suggestions for interacting with a specific student, and self-monitoring was associated with increases in students’ social interaction with high school classmates with autism. General education students (partners) learned to set interaction goals, decide how to interact with and monitor frequency of interactions with a paired student with autism in their general education elective classes, and evaluate whether they had achieved their goals during class sessions. Partners’ initiations to and time spent interacting with participants with autism increased to within a normative range established for general education dyads in each respective class (Guitar, Art, PE). Social validation feedback from general education partners, participants with autism, and general education teachers indicated that they perceived the intervention as effective and procedures as acceptable within the classroom context. This study represents an extension of previous investigations of social interaction among high school students with autism and their general education peers, as follows.

The current study falls in the camp of peer-mediated or peer support strategies in which the primary intervention
component is (a) general education peers as the active agent in initiating and maintaining social interaction with classmates with autism or intellectual disability (e.g., Carter et al., 2011) versus (b) strategies in which students with disabilities primarily are taught to initiate conversation or interaction with general education students (e.g., Scattone, Tingstrom, & Wilczynski, 2006), as categorized by Carter and Hughes (2005) and others. Although both approaches involve general education peers either as facilitators, recipients, or partners in social interaction with students with autism or intellectual disability, both typically involve considerable researcher or staff assistance.

Researchers in peer-mediated interventions in which preschool or elementary students are taught to engage classmates with disabilities in social interaction typically provide peers with instructional prompts, contingent praise, and token or tangible reinforcement to promote interaction (e.g., Thiemann & Goldstein, 2004). Peer support models in which middle or high school students are trained as facilitators of social interaction and class participation of classmates with disabilities typically involve paraprofessionals or teachers in monitoring and providing periodic assistance and performance feedback to peers (e.g., Shukla et al., 1999). Interventionists in studies in which general education peers have served as trainers or conversational partners to increase social skills of students with disabilities typically have set up opportunities for students with disabilities and their peers to interact, as well as provide instructions to peers (e.g., Hughes et al., 2000) or teach them to follow a script when interacting (Gaylord-Ross, Haring, Breen, & Pitts-Conway, 1984).

In contrast, in this study we introduced a novel approach to increase social interaction between high school students with autism and their general education peers: a self-management paradigm (e.g., Fantuzzo & Polite, 1990). Because we wanted general education partners to implement social interaction themselves without researcher or teacher assistance, partners would need a strategy they could use to prompt and reinforce their own behavior (Wehmeyer et al., 2007). As suggested by Locke and Latham (2002), goal setting can serve to direct individuals’ behavior by focusing their attention on requisite actions to reach a goal; therefore, we introduced goal setting along with self-monitoring and evaluation of goal achievement (e.g., Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011) as a strategy partners could use to determine and engage in a self-determined amount of interaction during a particular class.

Our study represents a departure from previous peer-delivered investigations because general education partners determined their goals on a daily basis, independently chose how and when they would interact with participants, monitored and evaluated goal attainment, and received no instructional prompts or performance feedback from researchers or teaching staff—whose presence may impede peer interaction in a setting, particularly if they remain in proximity (Carter et al., 2007). That is, implicit within the goal-setting paradigm was that considerable responsibility was given to partners to decide when and how to interact with participants. During training, general education partners were explicitly told to set a social interaction goal that seemed feasible within the context of the class based on the number of times they typically interacted with friends in class. Partners were told that goal setting could be an exciting part of the project because they, solely, would be in charge of how and with what frequency they interacted with participants per class session, and they could adjust their goals based on assigned class activities, such as a test. Indeed, the goal-setting strategy was associated with frequency of social interaction between general education partners and participants with autism that closely resembled that of general education dyads in the normative sample established for each class setting. Furthermore, because partners recorded on a daily basis goals set, interactions with participants, and goal attainment, an association between occurrence of goal setting and interacting with participants with autism is indicated (see Figure 1), representing an improvement over self-management studies that fail to report evidence that students actually implemented a self-management strategy (e.g., Rock, 2005).

Findings suggest that goal setting by general education students holds considerable promise for increasing social interaction with classmates with autism and other disabilities while lessening adult assistance. The goal-setting and self-monitoring strategy was simple and nonintrusive to implement versus the six-step model Rock (2005) instructed students to use to improve classroom performance. Binders used to hold self-monitoring sheets were the same as those used by students in the high school; their use did not appear to interrupt classroom activities of partners nor was self-monitoring cited in social validation feedback as difficult or intrusive to implement. Further, our intervention addressed Fantuzzo and Polite’s (1990) criticism that there is little “self” in self-management studies when students only monitor and record their behavior rather than determine their goals and evaluate goal attainment, such as students in our study did. Despite the potential benefits of social interaction goal setting as demonstrated in this study, however, we have identified no published study in which general education high school students have learned to set goals for interacting with their classmates with autism and to monitor and evaluate their goal attainment on a daily basis.

Importantly, this study addressed limitations of the social interaction literature raised in previous studies (e.g., Carter et al., 2007; DiSalvo & Oswald, 2002). Researchers investigating peer-delivered social interaction studies have called for establishing setting-specific normative comparisons of social interaction among students; they argue, however, that rarely are study results compared to interactions of typical students within a setting (e.g., Christopher, Hansen, & MacMillan, 1991;
DiSalvo & Oswald, 2002). Using the same direct observational measures for assessing target students’ behavior, we established a normative range of peer social interaction for each of the unique classroom settings in this study. Mean percentage of time general education classmates interacted varied across classes from a low of 18.1% of time in Guitar to 54.9% of time during PE; targeted partner–participant dyads’ percentage of time was found to vary to approximate normative means across classes. This finding is a remarkable validation of the purpose of our goal-setting intervention to provide general education students with the means to guide their interactive behavior toward students with autism to be similar in frequency and length as that of their other classmates. It is critical to establish a range of expected social interaction within a particular social context (Carter et al., 2007); failing to do so may result in social behavior that is unacceptable, stigmatizing, disruptive, or non-functional within a targeted environment.

Social interaction researchers have also criticized the peer mediation literature for failing to address the complexity, quality, and context of social interaction (e.g., DiSalvo & Oswald, 2002; Owen-DeSchryver, Carr, Cape, & Blakeley-Smith, 2008). Our qualitative account of variability in interaction across and within sessions also allowed us to identify factors (e.g., classroom activities, students’ workloads, instructional demands) related to changes in time spent interacting across participants as shown on Figure 1. For example, fluctuations in interaction times for Adam and Gwen typically related to Adam’s uneven workload or Gwen’s inconsistent presence in class rather than resistance or disinterest on the part of either student to interact with the other. Indeed, Adam was observed to interact with Gwen whenever she was present and he was not otherwise engaged in his own class assignments or required class activities (e.g., class critiques). Without attention to contextual variables, it may be tempting to attribute fluctuations in time spent interacting to spurious causes, such as preferring to spend time with other classmates (Owen-DeSchryver et al., 2008).

Finally, social interaction programs for secondary school students with autism and their general education peers typically include as participants students from one end of the autism spectrum or the other. For example, participants in investigations of social problem-solving interventions, such as Social Stories (Scattone et al., 2006) or SODA (Stop, Observe, Deliberate, Act) Stories (Bock, 2007) were middle school students with “high-functioning” autism or Asperger syndrome. In contrast, participants in interventions designed to teach social skills, such as initiating or responding to peers, were middle school students who had autism, intellectual disability, and limited verbal repertoires (e.g., Haring & Breen, 1992; Nentimp & Cole, 1992). Participants in our study, however, ranged from one student with high-functioning autism and extensive verbal skills (Damien) to one with severe autism and intellectual disability and extremely limited speech (Gwen). Nevertheless, the peer-delivered social interaction intervention (i.e., goal-setting package) was equally effective at increasing peer interaction and promoting positive outcomes (e.g., enjoying interactions together) for both general education partners and participants across the range of the autism spectrum. Demonstrating the effectiveness of an intervention that applies across a range of students with autism is a substantial finding because doing so illustrates the intervention’s versatility, feasibility, and practicality for teachers to adopt.

**Limitations and Recommendations for Future Research and Practice**

Several limitations to our investigation warrant attention. First, partners’ tallies of their interactions with participants often differed from our recorded frequency of their initiations to participants. For example, Adam’s self-reported interactions were consistently lower than our recorded initiations, whereas Franklin’s were often higher (see Figure 1). These discrepancies are not surprising because we did not define “interactions” for partners. Because we wanted partners to guide their interactions with participants, we wanted them to determine for themselves what they considered an interaction. Although we made suggestions in training with respect to activities participants preferred (e.g., talking about Michael Jackson, painting, shooting baskets), we wanted partners to choose how best to interact and tally interactions with participants. We were less concerned with how they defined an interaction than with having them set a goal for interacting and becoming aware of and responsible for their interacting behavior (cf. Locke & Latham, 2002).

Because partners’ and our tallies did not consistently match, the accuracy of self-report data may be questioned; however, several issues relevant to discrepancies should be considered. We measured partner’s initiations to participants, whereas partners measured interactions. Adam commented that he never knew how long Gwen would be in class so he tended to set a goal of “1” each day. Also, he indicated that he considered an episode of painting with Gwen as one extended interaction, whereas we scored verbal and nonverbal initiations directed toward Gwen (e.g., smiling, handing her a paintbrush, commenting on her art) that occurred within an interaction. Franklin’s lower observed initiations during later sessions as compared to his tallied interactions likely reflected Henry’s increased initiations to him ($M = 0$ [baseline] vs. 5.13 [intervention] initiations per session). Furthermore, as suggested by Korotitsch and Nelson-Gray (1999), accuracy of partners’ monitoring their behavior was not the primary aim; rather, we included self-monitoring as an intervention component because of its potential reactive effect (e.g., partners’ initiations increasing as a result of self-monitoring). The beneficial treatment effects of self-monitoring regardless of accuracy are well documented in classic behavioral studies.
Fourth, we did not address the issue of developing sustained social relationships between participants with autism and their general education partners. Although both participants and partners indicated in informal interviews that they did consider each other to be friends, no attempt was made to promote their social interactions or extend their friendships outside the classroom setting. Instead, our goal was to see if our intervention would be successful at increasing general education students’ initiations to and social interaction with their classmates with autism. Relatedly, readers may be concerned that our intervention created a one-sided approach to social interaction in which general education students served as “helpers” rather than “equals.” However, partners’ comments did not support this concern. For example, Franklin reported “[Henry] shows interest in things I like. If I told him I like the Celtics, he would come back and tell me how many champions they won.” Quincy said, “[Damien] showed me some of the blues chords that I missed in class. I made a good friend in class.” Nevertheless, future researchers should address the quality of interactions and friendships that emerge from a goal-setting package for general education students as introduced in this study.

Because social interaction between students with autism and other developmental disabilities and their general education peers typically does not occur without some form of programming even when they are in proximity (Carter et al., 2008; Hughes et al., 1999), teaching general education students to set and evaluate attainment of social interaction goals holds promise as a practical and desirable intervention strategy. Goal-setting training required minimal time and could be easily implemented by a teacher or paraprofessional with minimal instructional assistance. Furthermore, although not assessed in this study, because general education partners served as their own change agents in increasing their interactions with participants with autism, they may be likely to generalize and maintain such interactions over time and with other students with disabilities (Locke & Latham, 2002), expanding the effects of goal-setting packages beyond the sole contextual setting of social interaction interventions.

References


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