

A PEER-DELIVERED SOCIAL INTERACTION INTERVENTION FOR HIGH  
SCHOOL STUDENTS WITH AUTISM

By

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Dissertation

Submitted to the Faculty of the  
Graduate School of Vanderbilt University  
in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

in

Special Education

August, 2012

Nashville, Tennessee

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To my wonderful wife, Charlene and our prior and subsequent generations: John and Carolyn, Rebecca and Melvin, and Chiara, Benjamin, Jameson, and Brigham. Most crucial to my sustenance throughout was, is, and will be my all-knowing and all-loving Creator to whom I consecrate all my efforts and pray that He will consecrate my performance for the welfare of my soul.

## ACKNOWLEDGEMENTS

I am grateful to have received funding through a Federal Training Grant in Special Education, along with generous funding through Peabody's doctoral program. This work was also made possible through grants to Carolyn Hughes and Nicolette Brigham by the Marino Autism Research Initiative and Autism Speaks. I especially thank my advisor, Carolyn Hughes who provided critical and useful feedback along every step of the way. She assembled a marvelous research team, who I also depended on throughout the project. Contributing team members included: Rebekah Bernstein, Michaela Boykin, Nicolette Brigham, Anna Hall, Michelle Harvey, Jamie Heilingoetter, Lauren Kaplan, and Caitlin Reilly. I also want to thank the anonymous students, teachers and administrators at the truly supportive high school where our work was done. It was fun to be a small part of the lives of those young people with whom we worked and I wish them all a wonderful future.

I express my gratitude to the members of my Dissertation Committee who have been timely, helpful, and critical in just the right way to shepherd me over the benchmarks. Thank you for your great example of diligence, scholarship, and life.

The most important immediate people in all this were my family. Bravo family!

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## CHAPTER I

### INTRODUCTION

Despite the Individuals with Disabilities Education Act (IDEA) 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 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 without an instruction to socially interact with students with intellectual disability, even trained peer “buddies” who attended class daily with these students typically did not interact with them. 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. To illustrate, 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, Rotherman-Fuller, Locke, and Gulsrud (2012) taught small groups of elementary general education students strategies 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. Assignments to practice strategies were provided as well as reinforcement for interacting with classmates with autism. On the other hand, Owen-Deschryver, Carr, Cale, and Blakeley-Smith's (2008) study of elementary-aged children as peers was more naturalistic in allowing for sustained generalization of social interaction across lunch and recess after three 30-45 min training sessions across two weeks had been separately completed. A naturalistic peer-directed intervention of this kind has not yet been replicated at the secondary level.

Peer support models have been implemented in middle or high schools in which general education students support classmates with developmental disabilities to increase their social interaction and academic engagement (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 developmental disabilities. 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 Kurkowski (2007) taught general education peers to support social and communicative interaction and class participation of four students with developmental disabilities. Paraprofessionals assisted peers, as needed, throughout the intervention condition by facilitating interaction between students and peers and providing periodic performance feedback.

Researchers have incorporated use of some self-management techniques by peers 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 peers 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 use during the session. Researchers awarded prizes to students if their behavior matched the goals set. Although considerable adult assistance was provided, Thiemann and Goldstein's study represents a step toward increasing responsibility for guiding peer-delivered interactions by the peers themselves. However, we have found no comparable attempt in the literature to implement goal setting in conjunction with peer support social interaction interventions in middle or high school.

Limited social interaction for older students with autism has been attributed to both lack of social skills and lack of opportunity (Newman, 2007; Shattuck, Orsmond, Wagner, & Cooper, 2011). Spitzberg and Dillard defined social skills as "goal-directed

actions in interpersonal contexts that are learnable, repeatable, and variable in their quality” (2002, p. 90). Goal-setting research has demonstrated that in some cases it makes no difference whether one’s goal is set by oneself or someone else (Locke & Latham, 2002). However, teaching general education peers to set their own goals to increase their social interactions with classmates with autism may increase the likelihood that interaction will occur throughout the class period in a manner similar to how general education students typically interact with other classmates (Sainato et al., 1992). Further, teaching students to guide their own social interaction behavior removes the potential stigma of dependence on adults assisting students in general education settings (Carter & Kennedy, 2006; Carter et al., 2011) and increases the likelihood that the social behaviors will be acceptable to peers (Wentzel & Erdley, 1993) and will generalize across people, settings, and time (Stokes & Baer, 1977; Wehmeyer et al., 2007).

In the present study, we designed an innovative intervention 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, we simultaneously provided peers a brief disability awareness training and suggestions for socially interacting prior to implementing the social interaction intervention. The decision of when and how to interact with their peers with autism was made solely by the general education students; this decision was a novel feature of the intervention. We addressed these research questions: (a) Will a package that combines individual training of peers on goal-setting, self-monitoring, disability awareness, and social interaction promote sustained social interaction between a general education peer and a student with

autism in an inclusive high school classroom? (b) What features of the intervention or participant or peer 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, instruction, seating arrangements) affect opportunities for interaction?

## CHAPTER II

### METHOD

#### **Participants**

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.

**Special education participants.** Three students were selected to participate in the study based on the following criteria: (a) a diagnosis of autism, (b) teacher-identified need for 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 peers during a three-week prebaseline observation within their elective classes.

Damien was a 16-year-old Black male sophomore with autism. He was soft-spoken, rarely initiated to others, and generally displayed a flat affect. Damien typically sat by himself at lunch. He was fully included in all electives and most academic classes; however, a paraprofessional accompanied him to all classes, including his Guitar class. Although the paraprofessional was not seen offering assistance during the Guitar class, he did offer assistance when observed in academic classes. No peers interacted socially with

Damien in any of the prebaseline observations.

Gwen was a 17-year old White female junior with autism and severe intellectual disability. She had a limited verbal repertoire, responding “yes” to questions or repeating with a whispery voice the last word spoken to her by adults. She 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. Gwen received considerable paraprofessional assistance throughout the day to perform classroom procedures, which were also substantially modified for her. Although peers often greeted her at school, Gwen typically failed to respond without prompting by her paraprofessional. She often rocked backwards or forwards and flapped her hands in a stereotypical manner.

Henry was a 17-year-old White male junior with autism and mild intellectual disability. 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. (See Table 1 for additional participant characteristics.)

**General education participants (partners).** Three male general education students (2 Black, 1 White) were selected as social interaction partners. 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

Table 1

Participant Characteristics

Participant	Diagnosis/IQ	Adaptive behavior assessment	Speech/language assessment	Medical/behavioral history	Medication
Damien, 16, Black male	Autism, 33 <sup>a</sup> (mild to moderate ASD) IQ=84 <sup>b</sup>	Communication Parent=7 Teacher=8 Social Parent=9 Teacher=11 Total Parent=35 Teacher=10 <sup>c</sup>	83[7 <sup>th</sup> percentile] <sup>d</sup> , 50 <sup>e</sup> , 60 <sup>f</sup>	History of speech/language disorder	None reported
Gwen, 17, White female	Autism, 43.5 <sup>a</sup> (severe ASD) intellectual disability	Communication=64 Socialization=64 Composite=64 <sup>g</sup>	57 <sup>h</sup> , <63 <sup>i</sup>	History of behavioral services for self-injurious behavior and noncompliance	Strattera for ADHD <sup>j</sup> , Klonopin for seizures
Henry, 17, White male	Autism, 76 <sup>k</sup> , 37 <sup>a</sup> (severe ASD) IQ=60 <sup>l</sup>	Communication=1 Social=2 General Adaptive Composite=76 <sup>m</sup>	33[<1percentile] <sup>d</sup>	History of significant communication impairment, historical diagnosis of PDD-NOS, history of social skills deficits	Clonidine for ADHD <sup>j</sup>

*Note.* <sup>a</sup>Children Autism Rating Scale (CARS). <sup>b</sup>Comprehensive Test of Nonverbal Intelligence (CTONI). <sup>c</sup>Adaptive Behavior Evaluation Scale (ABES). <sup>d</sup>Goldman-Fristoe Test of Articulation 2 (G-FTA-2). <sup>e</sup>Clinical Evaluation of Language Fundamentals-Preschool (CELF-P). <sup>f</sup>Test of Language Development-Primary (TOLD-P). <sup>g</sup>Vineland Adaptive Behavior Scale (VABS). <sup>h</sup>Peabody Picture Vocabulary Test-III (PPVT-III). <sup>i</sup>Reynell Developmental Languages Scales-III (RDLs-III). <sup>j</sup>Attention deficit hyperactivity disorder. <sup>k</sup>Autism Behavior Checklist. <sup>l</sup>Stanford-Binet Intelligence Test-4<sup>th</sup> ed. <sup>m</sup>Adaptive Behavior Assessment Scale (ABAS).

agreement to monitor and record interactions with the participating student during class time. Teachers were asked to nominate potential partners, who were observed, selected, and invited to participate.

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 prosocial

behaviors toward classmates and social interaction with students seated near him. Prior to the intervention, the Guitar teacher had occasionally asked Quincy to help fellow students with class work.

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 had a common interest in painting with Gwen, and was recommended by both the art teacher and Gwen's special education teacher. He was occasionally observed to voluntarily greet or interact with other students from Gwen's class.

Franklin was a White male sophomore in Henry's physical education (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.

## **Settings**

Data were collected in three inclusive elective classroom settings. All classes were on a 90-min block schedule and met every other day. 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 class activities without additional support. He was never observed to interact with any peers or receive support from his paraprofessional during baseline.



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, occasionally talking quietly to each other. Approximately once per week, students and the instructor orally critiqued the class's displayed art work 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. During baseline, interaction and support were provided strictly by her paraprofessional, although occasionally the Art teacher would comment on 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.

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 classwide 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 and received no additional support.

### **Outcome Measures**

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

(a) *Initiation*. An initiation was defined as verbal or nonverbal behavior directed

toward a peer, 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. 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. Non-examples included Gwen touching a peer’s backpack or art supplies, Henry retrieving and throwing a stray ball back to a peer without verbally communicating, or Henry talking while there were no peers within speaking distance.

(b) *Acknowledgement*. An acknowledgement was defined as verbal or nonverbal behavior in response to a peer’s initiation. An acknowledgement could include a reciprocal response, such as returning a wave or greeting. For example, Gwen could look and smile at Adam when he said “Hi, Gwen.” A non-example could be Damien showing no change in body position or expression when asked, “What page are we on?” by a peer.

(c) *Interaction*. An interaction was defined as verbal or nonverbal behavior directed toward a peer that was subsequently *acknowledged* by the peer. A new interaction was scored after 15 s or more elapsed with no interaction between peers. 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 non-example included participating in an assigned class-wide activity, such as Henry simultaneously stretching and doing jumping jacks alongside his peers in PE.

(d) *Duration of interaction*. 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 recorded when more than 15 s elapsed between interactions.

(e) *Opportunity for interaction*. The social context of the environment was rated as 0, 1, or 2, based on opportunity for interacting socially with peers within the context of teacher or class-based demands without negative effects on performance, such as being reprimanded by a teacher or criticized by peers. Specifically, 0 = no opportunity (e.g., class taking a test); 1 = some opportunity (e.g., class engaged in class-wide discussion); or 2 = regular opportunity for interaction with peers (e.g., students eating in the lunchroom). Context was rescored during an observation session each time level of opportunity for interacting with peers changed.

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 and participants 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 peer, including the partner. Opportunities for interaction were also scored. 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 was conducted following each pair's final baseline session. Training began with Quincy, with training for the other two partners following sequentially in a quiet location (e.g., unused classroom) near each partner's targeted class. A researcher not serving as an 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*). 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. 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). 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” x 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 in class.

Training occurred during Session 7, 18, and 40 for Quincy, Adam, and Franklin,

respectively, after which trainer assistance was completely withdrawn to assess generalization.

**Social interaction and goal setting.** The social interaction and goal setting condition was identical to that of baseline 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 peer, including the partner, in addition to opportunities for interaction. As in baseline, no instructional feedback or environmental modifications were provided.

After an increase in social interaction between Quincy and Damien occurred with regularity ( $\geq 10$  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.

### **Observation and Recording Procedures**

Observers used event recording to record initiations, acknowledgements, and interactions of the participant with all general education classmates as they occurred, including the initiator, recipient, and time and duration of interaction. Interactions of the participants with their partners were scored separately from interactions with other classmates. Observers also scored opportunities for interaction, rescored as opportunity changed based on the social context of the classroom (e.g., after a test, free time was

allowed). In addition, observers recorded a narrative description of the activity in which the class was engaged as explanation of changes in opportunity for interaction. Observers also recorded partners' goals and self-recorded interactions as written in their binders.

### **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 minutes spent interacting (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.

Because we wanted to know how participants’ and partners’ interaction compared to a normative standard for peers 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 hours). Of the 40 students observed, demographic information was recorded for 38, of which 17 were Black, 16 White, and five Hispanic or other ethnicities; 19 (50%) were females.

### **Fidelity Measures**

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



## CHAPTER III

### 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 during sessions 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 peers 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) for

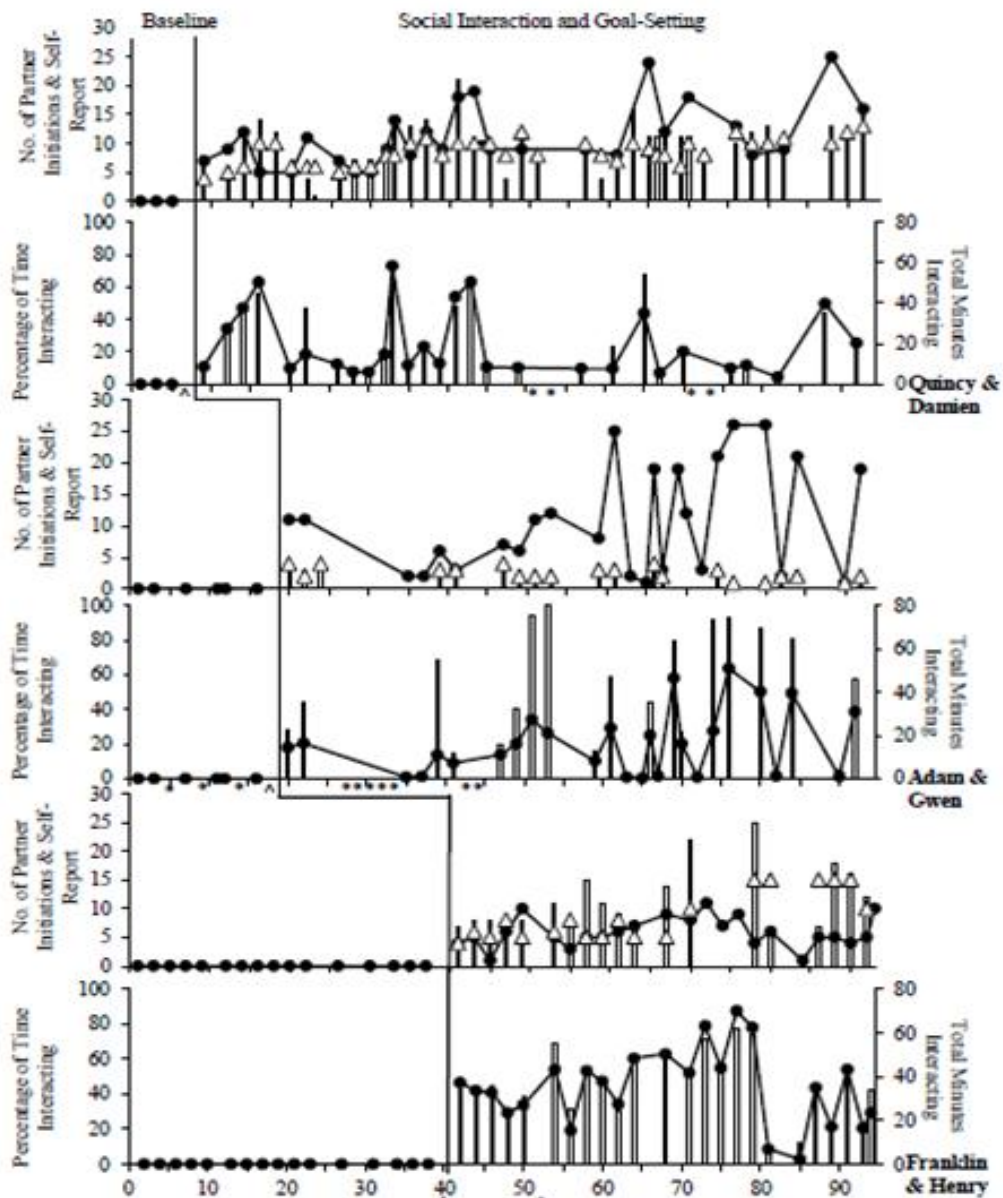


Figure 1. Upper panel displays the number of observed partner initiations to participant (closed circles), the partner's goal (open triangles), and the number of partner's self-reported interactions with participant (open bar). Data from sessions during which no observer was present are represented by open triangles and open bars only. Lower panel displays percentage of time (open bars) and the total minutes interacting (closed circles). Asterisks represent participant or partner absences. Caret represents social interaction/goal-setting training.

Figure 1.

### Social Interaction and Goal Setting

Adam, 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 peers. 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., 1-9s) 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 interactions 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 peers' interactions, the majority (40%) of interactions between Quincy and Damien were 1-9s, however, 12% (vs. 0% for peers) were 5 min or more. Further, 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 individual projects, as evidenced by 31% of interactions in the normative sample occurring for two or more minutes. 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 initiated to Gwen only twice for a total of 1 min during which the class was engaged in critiques for 36 of the 49 minutes 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 unpredictable; 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). Further, 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 postintervention 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 overwhelmingly engaged in only three activities in class: individual artwork, interacting with Gwen, or occasional class-wide 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 peers, such as during Sessions 65, 67, and 72. During each session, he initiated a short greeting to Gwen between 1-3 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 23-51 min with 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 class-wide 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 period of 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.** Participants’ responses to pre- and postintervention interview questions addressing their social goals are summarized in Table 2. 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

Table 2

Participants' Social Goals

Participant	Preintervention Question	Postintervention Question
	<i>Can you name some of your friends at school?</i>	<i>Do you have a new friend in _____ class now? Who is your new friend?</i>
Damien	"Morgan, Arnold, Sean, Nikia. That's all I know."	"Yes I do, his name is Quincy."
Gwen	Norma, Antonisha, Clayton, Clark, Devon, Tierra, Moses. <i>(Repeated names after prompt)</i>	"Yes. Adam."
Henry	"Kathryn, Olivia, Adam, Melissa, two Carlys."	"Franklin."
	<i>What do you like to do with them?</i>	<i>What do you do with _____ in _____ now?</i>
Damien	"Just hang out with them."	"He's part of our group and when we're done with our project we do it in front of the class."
Gwen	"Art, hugs, face."	"Paint. Art."
Henry	"Talking, have fun with them."	"We were talking about sports."
	<i>Would you like to have more friends when you go to your classes?</i>	<i>How do you like hanging out with _____ in your _____ class now</i>
Damien	"I don't know anybody. I only know one person."	"He's a nice guy."
Gwen	"Yes."	"Good... Fun."
Henry	"Yeah."	<i>(Nodded head)</i>
	<i>How do you feel when you meet someone new?</i>	<i>How do you feel when you talk to your new friend?</i>
Damien	"I just feel excited. I just like talking to them."	"I'm not shy about him."
Gwen	"Yes."	"Happy."
Henry	"I feel happy and nervous."	"Pretty good."
	<i>Tell me some things you could do to have more friends at school.</i>	<i>Would you like to have other new friends like _____ at school?</i>
Damien	"Talk to them, say hi, and get along better."	"I already have other friends."
Gwen	<i>(No response)</i>	"Yes."
Henry	"I don't know."	"Yes."



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 3. 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*. Mean responses across partners suggested that they generally found their interactions enjoyable ( $M = 4.0$ ), that they thought partners did as well ( $M = 4.1$ ), and that interactions were similar to those they had with friends ( $M = 3.6$ ). Quincy’s ratings were slightly lower than those 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 not served as an observer), also individually asked partners open-ended interview questions about their interaction experiences (see Table 4). 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

Table 3

## Partner Perceptions

	Did you enjoy this interaction?	Do you think your partner enjoyed this interaction?	When you are with your friends, do you have similar interactions?	<i>Overall Mean/Range</i>	Representative Comments
	<i>M (range)</i>	<i>M (range)</i>	<i>M (range)</i>	<i>M (range)</i>	
Quincy (8) <sup>a</sup>	3.3 (2-4) <sup>b</sup>	3.1 (2-4)	2.8 (1-4)	3.0 (1-4)	[It's going] really good. He's starting to say things to me first, which has been my goal.
Adam (4)	5.0 (5)	5.0 (5)	5.0 (5)	5.0 (5)	Gwen is more and more comfortable every day. At first I was nervous, but I've gotten more comfortable, too.
Franklin (4)	4.5 (4-5)	5.0 (5)	3.8 (3-4)	4.4 (3-5)	It's just what we [my friends and I] are doing.
<i>Overall Mean/Range</i>	4.0 (2-5)	4.1 (2-5)	3.6 (1-5)	3.9 (1-5)	

Note. <sup>a</sup>Number of ratings. <sup>b</sup>Ratings were on a scale of 1 (*not at all*) to 5 (*a lot*)

Table 4

Partner Postintervention Interviews

Question	Quincy	Adam	Franklin
<i>You did a great job this year with _____. You have some great skills for interacting with others. To what do you attribute this?</i>	“People have always told me that I have good communication and leadership skills and that I’m able to talk to lots of different people. I don’t know - I think it’s just a gift that I have.”	“It’s my overall mentality of being polite and being patient with everybody. It’s how I always am.”	“Having a good attitude.”
<i>How did it go spending time with _____ in class this year?</i>	“It went really good.”	“It was great. It was different but most of all it was great. ( <i>What do you mean by “different?”</i> ) I mean it was stepping away from the regular schedule of what I do in class. It was a new opportunity for me.”	“It went fine. We talked about sports.”
<i>Do you think _____ enjoyed it?</i>	“Yes.”	“Oh, yes! I could tell by how she smiled when she saw me.”	“Yes, now he fits in with everyone. He talks to everyone, like M_____ and J_____. He can start the conversation.”
<i>How would you say _____ benefitted from your interactions with her/him in class?</i>	“We got to know each other as friends. He got more communicative. Sometimes he would ask me questions about myself. Not a lot but he started to open up more especially when we had time in class to talk. I think he started to feel more comfortable talking.”	“She made a friend. She opened up to me.”	“It’s easier for him to approach people now. Like he would talk to me about the hockey playoffs and the Predators.”

Table 4, continued

Question	Quincy	Adam	Franklin
<i>Are there ways you benefitted from spending time with ____? If so, what are they?</i>	“Yes, at first I was a little nervous but then I started asking him questions about music and things he liked. He helped me too with the guitar. He’s slower than some of the others in class but he gets the right notes. He showed me some of the blues chords that I missed. I made a good friend in class.”	“Most definitely! I learned what she responds to and what she doesn’t respond to. I’ve gotten to know a broad range of special needs kids now. It opened my eyes to a different world. I was able to put myself in her shoes and see the world through her perspective. I knew that she would have a vision when she painted. She would shut her eyes and then she would just paint.”	“I’m more patient and understanding now. He shows interest in things I like. He knows a lot about sports. If I told him I like the Celtics, he would come back and tell me ‘The Celtics won 17 championships and the Lakers won 16.’”
<i>Do you think you had enough training to interact with ____?</i>	“Yes.”	“Yes, it’s not hard to communicate with someone who doesn’t speak.”	“Yes.”
<i>Are there other things we could have done to help you?</i>	“When [the observers] weren’t here I didn’t know if I should or shouldn’t [fill in the book] but I did anyway.”	“[The paraprofessional] helped because I saw how she communicated with Gwen. She is wonderful. She loves it. You can just tell.”	“No, he’s fitting in OK now. He’s getting comfortable. Not everyone would be able to do it, though.”
<i>Do you think that setting a goal and monitoring your interaction with ____ helped? Why or why not?</i>	“Yes, I had a goal and that was to get him to speak more. The goal was just having a friendship.”	“Yes, it was good in order to keep up the consistency with interacting. I always had a goal but I never knew how long I would have to interact. That’s why I would put down ‘1’ because I didn’t want to just leave and then keep coming back so I would have a higher number. That’s why I would keep it to one long interaction.”	“Yes, it’s good to have in your mind but I think it’s about quality, not numbers.”

Table 4, continued

Question	Quincy	Adam	Franklin
<i>What did your other classmates think about you interacting with ____ in class?</i>	“I didn’t think about it. Whenever we worked in a group, the others students would be nice to him and would ask him ‘How you doing?’”	“They would say ‘Oh, Adam, you’re so sweet. I don’t know how you do it.’ That’s what everyone says all the time, like the staff when they see me interacting with the special needs kids in lunch. They always say, ‘You’re so sweet.’”	“They thought it was a good thing. Not everyone would want to participate but they thought it was good.” “Yes, a friend.”
<i>Do you consider ____ a friend or an acquaintance?</i>	“I think of him just like I think of all my other friends. He is just shy and doesn’t talk much. That’s like some of my other friends.”	“A friend, most definitely.”	“Yes, a friend.”
<i>Do you ever see ____ outside of class? If so, do you talk to ____ outside of this class? Will you continue to?</i>	Yes. Yes, we have classes that are next to each other after this class and we say hi to each. Sometimes he says it first. He doesn’t sit with us at lunch but he sees us and he always says “hi” and we say “hi” to him.	Yes, all the time. Yes, I always do. Of course. Like when I saw her walking by herself in the courtyard. When she saw me, she just ran over and smiled. Then [the para] came and said, “I’ll take care of her.”	Yes, in the halls. Yes, we say “hi.”
<i>Are there other thoughts you’d like to share about interacting with ____?</i>	“Some of the pages in the book had extra questions but sometimes those were on days when not much happened. Sometimes I had more to say but those weren’t the days when there were more questions in the book. Maybe you could put the questions in there every time and say that it’s optional to answer them.”	“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. We could have been in P.E. and interacting in there. Painting was just the circumstance of what was going on in here. It could have anywhere, like in lunch or when we were digging around in the greenhouse we were always interacting. The main thing was the friendship and getting to know each other—not the painting itself.”	“No. That’s about it.”

more than engaging in the activity itself. For example, Quincy stated that “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.

Outside of their targeted classes, Adam mentioned participating in activities with Gwen and her special education class (e.g., digging in the school greenhouse) while 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 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 Art 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 idea 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 concurred that “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

## CHAPTER IV

### DISCUSSION

Individual training of three general education high school students that combined disability awareness, goal setting, and self-monitoring was associated with increases in their social interaction with high school classmates with autism. Participating students (partners) learned to set interaction goals, 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 (a) general education peers are 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 may involve general education partners in social interaction with students with autism or intellectual disability, peer-mediated approaches tend to emphasize peers as facilitators, whereas other approaches focus on peers as recipients. Both approaches 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 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 peers determined their goals, monitored, and evaluated goal attainment on a daily basis, 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). During training, peers 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. Peers were told goal setting could be an exciting part of the project because they, solely, would be in charge of how often they interacted with the participant 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 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. Further, because partners recorded goals set, interactions with participants, and goal attainment, on a daily basis, an association between occurrence of goal setting and interacting with peers 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 peers 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 similar to 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. To our knowledge, this study is the first of its kind 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 peers; 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 peers 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 validates the purpose of our goal-setting intervention: to provide general education peers with the means to guide their interactive behavior toward participants to be similar in frequency and length as that of their peers. 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 nonfunctional 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 et al., 2008). Researchers have called for emphasizing qualitative along with quantitative measures of social interaction—particularly peer feedback—that ultimately affect naturally-occurring peer relationships (DiSalvo & Oswald, 2002). We asked general education partners to evaluate their interactions with participants following approximately every fifth interaction. Partners were asked to write open-ended comments (e.g., “He’s starting to say things to me first, which has been my goal.”) in addition to completing a three-item rating scale. We also asked partners open-ended interview questions postintervention, responses to which indicated that partners valued the quality of their interactions with participants (e.g., “It’s good to have a [goal] in mind, but I think it’s about quality, not numbers.”). Although the activity in which dyads were engaged (e.g., practicing guitar or playing basketball) may have appeared to be the partners’ focus, all partners cited getting to know participants and helping them “open up” as their primary goal when interacting. For example, Quincy said, “Yes, I had a goal and that was to get [Damien] to speak more. The goal was just

having a friendship,” which refuted any assumptions that, since Quincy often helped Damien learn guitar chords when they practiced together, his main goal was helping Damien increase his guitar skills.

Adam and Gwen’s interactions were primarily nonverbal (e.g., painting together, gesturing, smiling), likely resulting from Gwen’s limited verbal repertoire. Nevertheless, Adam stated, “The main thing was the friendship and getting to know each other—not the painting itself.” Likewise, although Franklin and Henry largely shot baskets together when they interacted, Franklin never once mentioned playing basketball when asked to evaluate their interactions. Instead, he responded that “It went fine. We talked about sports,” and then elaborated that he liked that Henry was now “start[ing] the conversation...and show[ing] interest in things I like.” These findings are informative with respect to peers’ priorities in interacting with classmates with disabilities and suggest that developing friendships and relationships should be a major emphasis in any peer intervention, as corroborated by comments of participants with autism in the study who each named their partner when asked if they had new friends in class.

Open-ended interviews with participating general education teachers also underscored the importance of obtaining qualitative feedback, particularly with respect to the context of interactions and classroom settings. Teachers shared that more academic, lecture-oriented classes (e.g., Music Theory) would be less conducive to social interaction than, for example, the beginning Guitar or advanced Art classes in which participants were enrolled and that allowed opportunities to practice together (Guitar) or individualized work on assignments (Art). All teachers cited benefits they observed that both general education peers and students with autism experienced as a result of the

intervention (e.g., “It helped Henry and Franklin interact with people they may never have interacted with.”), suggesting the importance of assessing teachers’ attitudes toward peer interaction to determine their buy-in and support of a social interaction intervention before deciding to implement a program within a particular setting.

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 Table 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, researchers may have spuriously attributed fluctuations in time spent interacting to internal or unobservable causes, such as shifts in mood or motivation (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; Nientimp & 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., making a new friend, 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 since 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 that they set a goal for

interacting and became aware of and responsible for their interacting behavior (cf. Locke & Latham, 2002; Spitzberg & Dillard, 2002).

Since 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 while 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). Further, 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 (e.g., Broden, Hall, & Mitts, 1971; Fixsen, Phillips, & Wolf, 1972) and are particularly salient when used in combination with goal setting and goal attainment evaluation (Bandura & Cervone, 1983; Locke & Latham, 2002), such as partners did independently in this study. Considering the portability, nonintrusiveness, and effectiveness of the goal setting and self-monitoring procedure introduced in this study, we recommend its extended use in future peer-delivered social interaction intervention



efforts, in part because of its reactive effects.

Second, we used frequency ratio estimates of interobserver agreement rather than point-by-point estimates (Kazdin, 1982). That is, we calculated agreement on the total number of behaviors scored by two observers without determining if observers agreed on any particular occurrence of a behavior. As suggested by Kazdin (1982), however, because the totals reported by two observers in our study were generally close (e.g., within 10-20% margin of error), it is likely that observers generally agreed on occurrence of behaviors. Further, frequency ratio agreement is less subject to error when assessing total time engaged in a behavior, such as total minutes interacting—one of our primary dependent measures—than actual occurrences of behavior. Although point-by-point agreement has been used in previous social interaction studies in high school (e.g. Carter et al., 2011), doing so typically requires that observers are in close proximity to dyads or the use of videotaping or electronic devices (e.g., Carter, Sisco, Brown, Brickham, & Al-Khabbaz, 2008). Because our aim was to promote naturalistic interactions as initiated by members of the dyad, we chose to observe as unobtrusively as possible (typically behind or a distance from them). Future researchers are encouraged to investigate the use of alternative, yet unobtrusive, means to allow collecting point-by-point agreement estimates.

Third, in any case when observers are present during social interaction interventions, it is reasonable to question if their presence prompts or inhibits interaction. This possibility is less likely in our study, however, because observers were present during extended pre-baseline and baseline sessions in which no interaction was observed across any partners with participants. Observers also were not involved in training

partners. Further, Quincy, who was observed only every other session following Session 45, did not appear to overestimate frequency of interactions when observers were absent. For example, his mean self-reported interactions when observers were absent was 8.5 (range = 1-16), which was similar to his tallies in the presence of observers ( $M = 10.1$ ; range = 4-21), indicating presence of observers likely did not influence his interacting or self-monitoring behavior. Although this condition was not used with the other partners, similar procedures should be investigated in future social interaction research to determine possible reactive effects of observers.

Although the explanation of variability based on the class setting (e.g., seating arrangements, class activities, and teacher instruction and their impact on opportunity for interaction) fits logically and methodologically within the framework of this present single subject intervention, factors such as personality, motivation, health/sickness (Carr, Magito McLaughlin, Giacobbe-Grieco, & Smith, 2003; Carr & Owen-DeSchryver, 2007), IQ, verbal communication skills (all students with autism had lower than average IQ, and adaptive behavioral scores for verbal communication), age, gender roles, and race/ethnicity, may not conclusively be ruled out as having accounted for a portion of the variability. Replications to extend this study may more fully account for some or all of these factors. For example, a within-subject multiple baseline design across settings may offer more accurate control for setting-related variability (e.g., Hughes et al., 2011).

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. Peer training required minimal time and could be easily implemented by a teacher or paraprofessional with minimal instructional assistance. Further, although not assessed in this study, because general education partners served as their own change agents in increasing their interactions with peers with autism, they may be likely to generalize and maintain such interactions over time and with other students with disabilities (Wehmeyer et al., 2007), expanding the effects of goal-setting packages beyond the sole contextual setting of social interaction interventions.

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