Structural Analysis to Inform Peer Support Arrangements for High School Students with Autism

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CHAPTER 1

INTRODUCTION

For students with autism, navigating social relationships with peers can be challenging. Deficits in social communication and interaction associated with an autism diagnosis include difficulties with verbal and nonverbal communication (e.g., reading gestures, interpreting body language or facial expressions), understanding social pragmatics (e.g., using language for different purposes, adjusting social behavior for different contexts), and developing and maintaining relationships (American Psychiatric Association [APA], 2013). Students with autism also exhibit restricted patterns of behavior or interest (APA, 2013), often limiting the flexibility required in social situations or presenting as a lack of motivation to interact with those who do not share similar interests. Students with autism often engage in behaviors—such as repetitive behaviors, aggression, or self-injury—which may limit opportunities to participate academically and/or socially with peers or may be off-putting to others. Although each is a core deficit of autism, the topography and level of severity of symptoms varies considerably across each individual with autism.

In spite of the increased enrollment of students with autism in general education classes (U.S. Department of Education, 2011), the social and behavioral challenges faced by many students with autism make meaningful academic and social participation with classmates that much more challenging. Furthermore, many students with autism encounter barriers, in addition to those inherent to an autism diagnosis, which may limit meaningful access to the many social benefits of general education classrooms. Peer attitudes about students with disabilities may

interfere with their willingness to interact with students with autism (Carter et al., 2014). Classrooms factors, such as the emphasis on lecture and whole-group instruction in high school classrooms, often preclude students' conversation, collaboration, or requests for assistance. Moreover, students with autism may remain on the periphery of classroom activities, unable to fully participate with their classmates.

Researcher exploration of the use of one-to-one adult support for students with disabilities in general education classes has identified another potential reason for these students' limited ability to participate socially and academically with their classmates (Broer, Doyle, & Giangreco, 2005; Giangreco & Broer, 2007; Giangreco, Broer, & Suter, 2011). Students with autism spend a substantial proportion of time in close proximity to paraprofessionals (Feldman, Carter, Asmus, & Brock, 2015; Giangreco, 2010; Giangreco & Broer, 2007), which may hinder social interactions in a number of ways. The constant presence of a paraprofessional can lead to changes in the motivation or perception of students with and without disabilities. For example, familiarity or reliance on adult support may lead students with disabilities to interact primarily with that adult, rather than classmates. In interviews conducted by Broer, Doyle, and Giangreco (2005), many students with disabilities, including intellectual disability, Down syndrome, and emotional and behavior disorders, reported feeling socially isolated from the rest of the school and negativity toward paraprofessionals who interfere with their ability to interact or develop social relationships with peers. Peers also may perceive students with autism as unable or unmotivated to interact or participate socially or academically with anyone other than the adults with whom they work (e.g., paraprofessionals, special educators).

Peer Support Arrangements as an Alternative to Adult Support

The lack of empirical support for one-to-one adult support models has led researchers to

examine alternatives, including peer support arrangements (e.g., Carter et al., 2016). Peer support arrangements involve identifying one or more peers in the same general education class, who are guided by an adult to provide ongoing academic, social, and behavioral support to a student with severe disabilities throughout the semester (Carter, Moss, Hoffman, Chung, & Sisco, 2011). The research supporting the use of this intervention at the secondary level is substantial. In a recent study involving 99 high school students randomly assigned to receive peer support arrangements or direct adult support (i.e., business as usual), students with severe disabilities (i.e., intellectual disability or autism) who worked with their peers had significant social and academic gains, including increases in social interactions, number of peers with whom they interacted, and academic engagement (Carter et al., 2016). Exploratory analysis of these results found no significant difference between effects for students with and without autism. In addition, seven single-case design studies have addressed the effectiveness of peer support interventions in secondary settings (Brock, Biggs, Carter, Cattey, & Raley, 2016; Brock & Carter, 2015; Carter et al. 2011; Carter, Sisco, Melekoglu, & Kurkowski, 2007; Cushing, Kennedy, Shukla, Davis, & Meyer, 1997; Shukla, Kennedy, & Cushing, 1998, 1999).

However, across this body of research, only three studies included students with autism (Brock et al., 2016; Brock & Carter, 2015; Carter et al., 2016), none of whom were without significant cognitive impairment (i.e., alternate assessment eligible). Furthermore, of the three studies evaluating the effectiveness of peer support arrangements in high schools, only one study included students with autism (Carter et al., 2016). Given the widely varying content areas and instructional formats across high school classrooms, the complexity of social interactions during adolescence, and the increased importance of developing social skills and relationships during high school, further examination of the effectiveness and feasibility of peer support arrangements

for high school students with autism is critical.

The Role of Formative Assessment in Peer-mediated Interventions

As researchers continue to establish peer support arrangements as an evidence-based practice to increase social interactions and academic engagement for high school students with autism, research addressing how to identify and address individual differences within the intervention is essential. Although individuals with autism share common deficits in social interactions, their social and academic support needs vary widely, making the identification of those needs and individualizing social interventions crucial to maximize student outcomes. Differences across the classrooms in which they participate, such as academic content, behavioral expectations, and classroom culture, further necessitate the tailoring of peer support interventions. To date, the role of assessment as a means of tailoring peer-mediated interventions has focused on parametric or component analyses. For example, Carter, Cushing, Clark, and Kennedy (2005) compared the effects of one vs. two peers partners in peer support arrangements, finding increased levels of social interactions and contact with curriculum for all participants when working with two peers. A similar component analysis by Shukla, Kennedy, and Cushing (1998) evaluated the effects of adult supervision associated with peer support arrangements on the academic performance of peer partners. The purpose of this study was to parse out whether benefits experienced by peer partners resulted from added involvement of the special educator or from participation in the peer support arrangement. In each case, the focus of the study was to evaluate the effects of varying levels of a specific intervention component, not to individualize implementation for each student. Studies addressing whether or not interventions or their individual components work are important, but additional studies are needed to identify ways peer support interventions can be further refined to meet the varying needs of students with

autism.

Although data-based individualization is a guiding principle of special education, assessment often is considered as a summative evaluative method to determine the effectiveness of interventions. However, the use of formative data collection is crucial for developing truly individualized interventions. Data-based adaptations to interventions are considered best practice for special education services because data provides objective support for decisions on how to individualize. Intervention adaptations based on assessment data are more likely to be effective in targeting the unique needs of each student with autism (National Autism Center [NAC], 2009). Formative assessment is prominent in the literature on response to intervention for academic behavior and school-wide discipline. However, the guidelines for data-based decision making to individualize interventions targeting pro-social behaviors, including improved social interactions and communication, are not as clear (Hawken, Vincent, & Schumann, 2008). For example, although functional behavior assessment (FBA) is frequently proffered as a means of informing social and behavioral interventions, no studies have examined the use of FBA as a means of targeting social outcomes for students with autism (Wong et al., 2014). Assessment-based decisions to inform social interventions is critical for maximizing educational and social opportunities while meeting the wide range of social needs for students with autism.

In their review of the use of data-driven approaches to individualize peer-mediated interventions for students with autism, Huber and Carter (2016) identified 29 studies incorporating assessment to inform the design of intervention components or choice of outcomes. The assessment procedures employed in these studies included direct observation, interviews, questionnaires, document reviews, and structural analysis. Vague descriptions of consultation with various stakeholders also were common. Overall, descriptions of assessment

procedures were insufficient for replication or to draw conclusions about the quality of assessment procedures. Furthermore, only one study (i.e., Peck, Sasso, & Jolivette, 1997) experimentally examined the effectiveness of the assessment-based intervention, but researchers failed to establish functional relations for the participants with autism. Findings from this review reflect a need for additional high-quality research investigating the effectiveness of assessment-based individualization of peer-mediated interventions for students with autism. The majority of the 29 studies included in this review compared the effects of an individualized intervention to baseline or control group, which is insufficient to attribute any improvements in the impact of the intervention to assessment-based adaptations. To determine if a formative assessment method is effective, it is necessary for researchers to clearly test adaptations made based on formative data by comparing the effects of unaltered peer-mediated interventions with adapted ones.

One of the few assessment procedures examined as a means of informing social interventions for students with disabilities is *structural analysis* (Stichter & Conroy, 2005). Structural analysis is the experimental analysis of contextual variables (i.e., antecedents, setting events, or other environmental variables) that may increase or decrease the likelihood a behavior will occur (Stichter & Conroy, 2005), specifically focusing on the role of contextual variables that set the stage for or precede a specific behavior. Although much attention has been given to the use of structural analysis to address problem behavior (e.g., Kennedy & Itkonen, 1993) and academic performance (e.g., Jolivette, Wehby, & Hirsch, 1999; Kern, Childs, Dunlap, Clarke, & Falk, 1994), few studies utilized structural analysis to develop social-focused interventions for students with autism. Peck, Sasso, and Jolivette (1997) conducted structural analyses in special education classrooms to test the effects of various contextual variables (e.g., peer interactions, task structure, noise level) on the social interactions and on-task behavior of five elementary

school students, two of whom had autism. Stichter, Randolph, Kay, and Gage (2009) involved peers in structural analyses to examine the effects of various contexts on pro-social (e.g., interactions and engagement) and problem behaviors (e.g., touching peers) of three elementary school participants with autism across general education settings. Likewise, Boyd, Conroy, Mancil, Nakao, and Alter (2007) used structural analysis to understand the effects of circumscribed interests on social behaviors of young children with autism in pre-school and kindergarten. In each of these studies, researchers conducted structural analyses to create antecedent-based interventions based on results. None looked at structural analysis as a means of informing adaptations to an existing intervention.

The potential for the utility of structural analysis as a formative assessment practice, especially for social interventions, is promising. Because structural analysis requires consequences for target behavior remain constant across conditions, it may be more appropriate than functional analysis for assessment of low frequency behaviors, such as the social interactions of a student with autism who rarely interacts with peers. Reinforcing social consequences (e.g., positive affect, praise) can be used consistently following a student's social interactions to ensure those interactions are not extinguished by the removal of reinforcement. In addition, the structural analysis procedure is fitting for implementation in natural settings and is appropriate to incorporate natural change agents, such as peer conversations partners and adults who provide support (Stichter & Conroy, 2005). Assessment in the natural social context is particularly useful for social interactions, which often vary by communicative partner and social settings.

One potential drawback to using structural analysis in complex natural settings relates to the complexity of typical social contexts. In many social settings, including general education

classrooms, the list of possible antecedents, setting events, or environmental factors influencing a particular social behavior can be extensive. Unlike functional analysis, for which there is a standard set of conditions to test, no similar standard exists for structural analysis. However, this challenge can be mediated by conducting a structural analysis with a more limited set of possible influential contextual variables. The application of this assessment procedure in the context of an existing intervention, such as a peer support intervention, reduces the list of all potentially relevant contextual factors from those of the entire classroom to those specific to the peer support arrangement.

The current study extends my prior study examining the use of structural analysis to inform peer support interventions for high school students with severe disabilities (i.e., a primary disability label of autism and/or intellectual disability and eligibility for the state's alternate assessment; Huber, Carter, Shaw, & Stankiewicz, 2016). I examined (a) the effectiveness and feasibility of structural analysis using trained peers in general education classrooms, and (b) the effectiveness of structural analysis-based adaptations to an existing peer-support intervention. Using a multiple-probe-across-participants design, I first demonstrated the effects of peer support arrangements across three participants with severe disabilities. Next, I conducted structural analyses to test hypotheses about contextual variables relevant to peer support arrangements thought to increase or decrease social behaviors. I introduced adaptations based on the structural analysis results as part of the experimental design to test the effectiveness of adapted peer support arrangements, as compared to the un-adapted treatment. Results for three participants indicated functional relations between peer support arrangements and increases in social interactions and modest improvements academic engagement. Structural analyses yielded results used to refine peer support arrangements. While I hypothesized that adaptations based on the

combinations of contextual variables with higher levels of social interactions during structural analyses would result in similar improvements when integrated into peer support arrangements, I observed this with only one participant. However, decreased variability in social interactions of the other two participants provided consistent opportunities to engage with peers and predictability allowing for systematic practice of social skills. While not entirely aligned with my expectations, these results demonstrated peer support interventions can be further refined.

I designed the current study to extend this pilot work. First, this study included only high school participants with autism, a population of students underrepresented in the current peer support literature. Second, I used a refined observational data collection system, including a more sensitive measure of interaction quality (i.e., content and affect), collected more frequently throughout each observation period. Third, I included observational measures of peer academic support and adult facilitative behaviors to explore how levels of these behaviors may vary across peer support arrangements and/or shift over time and how each may impact outcomes. Fourth, I increased the involvement of general educators during the peer support planning process, peer recruitment, and ongoing facilitation with a focus on academic modifications and adaptations.

The purpose of the current study was to (a) evaluate the effectiveness of peer support arrangements and (b) examine the use of structural analysis as a means of refining this intervention for high school students with autism in general education classrooms. Specifically, I addressed the following research questions:

1. Are peer support arrangements effective at increasing the social interactions of students with autism relative to an adult support model?
2. Is structural analysis a feasible and effective means of assessing the effects of contextual variables related to peer support arrangements on social interactions when conducted in

general education classrooms and involving trained peers?

3. How does the addition of structural analysis-based components to peer support arrangements impact social interactions?
4. How do facilitators, general educators, peers, and students with autism view the acceptability and impact of peer support arrangements and the structural analysis process?

CHAPTER 2

METHOD

Participants and Setting

After receiving university and district approval, I recruited participating students and staff from 3 high schools in Tennessee through special education case managers.

Students with autism. To be included in this study, students had to (a) have a primary or secondary special education category of autism; (b) be included in at least one general education classroom, other than physical education; (c) have an individually assigned paraprofessional or special educator present in the general education class; (d) provide parental consent; and (e) provide written assent. Case managers nominated six students with autism for participation in the study. Because improvements in social interaction were the primary goal of the intervention, I excluded one student whose baseline level of social interactions consistently approximated his classmates based on peer comparison data. I excluded another student who did not have a consistent general education teacher assigned to his art class. One student declined participation because she did not feel she would benefit from working with her classmates. Three students participated in this study (see Table 1 for participant and setting characteristics).

Samuel. Samuel was 17-year-old, White male with autism and intellectual disability. He was in 10th grade and was eligible for the state's alternate assessment for students with significant cognitive impairments. He was enrolled in four general education classes (i.e., Carpentry, Agricultural Science, Art, P.E.) during which he received curriculum modifications (e.g., directions given in multiple formats, directions given in small and distinct steps, modified

Table 1

Participant and Classroom Characteristics

Focus student (gender; age)	Special education disability category	IQ	CARS	SSIS Social skills	SSIS Problem behavior	Class (total enrollment)	Peer partners
Samuel (male; 17)	Autism, ID	50	41.5	78	129	Carpentry (8 students)	Male, 15
Allen (male; 17)	Autism, ID	46	39	96	115	Nutrition (17 students)	Female, 16 Female, 18 Female, 17
Nathan (male; 14)	Autism, SLD	92	24.5	86	96	Biology (29 students)	Male, 14 Male, 14

Note. ID=Intellectual disability. SLD=Specific Learning Disability. CARS=Childhood Autism Rating Scale 2 scores. SSIS=Social Skills Improvement Scale. SSIS scores reported are standard scores from teacher rating scales.

difficulty level of content, flexible time limits and breaks, modified worksheet format, shorter tests, peer tutoring). At the start of the study, he was not receiving any peer tutoring. I conducted the study in Samuel's Carpentry class, which I selected randomly from the three general education classes meeting inclusion criteria. Samuel communicated verbally using full, but short sentences. During baseline observations, he rarely interacted with peers, and often only responded to adults when asked a direct question. The only social goal in his Individual Education Plan (IEP) included initiating or responding to questions in an audible tone. He rarely engaged in class activities unless directed by the paraprofessional and required frequent prompts to continue working.

The 50-min Carpentry class had 8 students, and Samuel was one two students receiving paraprofessional support. During the class period, a paraprofessional modified his assignments or found alternative activities (e.g., cleaning or organizing materials) for Samuel to complete when

other students used equipment deemed too dangerous for Samuel (e.g., power tools, saws).

Allen. Allen was a 17-year-old, White male with intellectual disability and autism, who was eligible for the state's alternate assessment. He was enrolled in 3 general education classes (i.e., Nutrition, Theatre, P.E.) during which he received curriculum modifications (e.g., directions given in alternate format, modified difficulty level or abbreviated of assignments, modified testing content, repeated directions and/or prompting during tests, use of manipulatives, peer tutoring, social skills instruction). Allen had no social goals in his IEP. At the start of the study, Allen was not receiving any peer tutoring but occasionally participated in an afterschool peer buddy program. Allen communicated verbally using full sentences. He demonstrated difficulty making and maintaining eye contact and engaged in high rates of verbal (e.g., scripting, talking to himself) and physical (e.g., pacing on tiptoes, looking up at lights, flicking his fingers in front of his eyes) abnormal repetitive behavior.

The 47-min Nutrition class had 17 students. Prior to the study, Allen sat next to another student with severe disabilities and completed most of his assignments with direct adult support, unless assigned by the general educator to work with a peer without disabilities.

Nathan. Nathan was a 14-year-old, White male with autism and specific learning disability. He was pursuing a high school diploma and had testing accommodations, including directions given in multiple formats, oral testing (i.e., read aloud), and extended time. He also had additional curriculum accommodations, including preferential seating, ability to type assignments as needed, and advanced copies of lecture slides to assist with note taking. Nathan had no goals related to social development in his IEP. He was enrolled in 4 general education classes (i.e., Biology, World History, Algebra, and P.E.). Nathan demonstrated average verbal ability and was able to engage in typical conversations with peers about age-appropriate topics,

including sports, hobbies, and personal interests. During pre-baseline observations, Nathan often showed interest in classmates' conversations, attending and often laughing along with others, but he rarely joined in.

Twenty-nine students were enrolled in Nathan's Biology class, which was scheduled to last 47 min. His special education case manager provided push-in support for him and 11 other students with various disabilities. Throughout the period, she monitored his note taking, asked questions to ensure understanding of core concepts, and checked the accuracy of his assignments. She pulled students with testing accommodations, including Nathan, to another room to complete all tests and quizzes

Facilitators. I recruited paraprofessionals and special educators assigned to each student to facilitate the peer support intervention. Samuel's facilitator was a White female with 4 years of experience in her current position as a paraprofessional. She had worked with Samuel the previous 3 years. She was nearing completion of her bachelor's degree in special education but was not yet certified to teach. She was responsible for providing support to Samuel and one additional student with a disability in his Carpentry class. She had participated in a research project examining peer support arrangements 3 years prior. Allen's paraprofessional was a White female who held a master's degree in art. She had 3 years of experience as a special education paraprofessional working with Allen. She and three other paraprofessionals provided support for seven students with disabilities in Allen's Nutrition class. Nathan's special education resource teacher provided push-in support for him and 11 other students in Nathan's biology class and was recruited to facilitate his peer support intervention. She was a White female with a master's degree and 15 years of experience in special education, 3 of which were in her current position.

Peer partners. Facilitators invited up to three peers in each class to be "peer partners"

within each peer support arrangement. Inclusion criteria for peer partners were (a) they did not have autism or intellectual disability and (b) they did not qualify for the alternate assessment. Facilitators consulted with the focus student and general educator to identify peers with whom the focus student was acquainted or preferred, who had consistent attendance, who was considered to be a positive role model, and who was willing to help others. Facilitators documented the reasons for recruiting each potential peer partner and the reasons given if peers decided not to participate (see Appendix A). Of the eight peers invited to participate, six agreed to do so. Two peers in Samuel's Carpentry class expressed interest in participating but never returned parent consent forms. Table 2 summarizes reasons for recruiting each peer.

Samuel's peer partner was a 15-year-old, White male in 10th grade. He had no prior experience a peer partner. Allen's peer partners were three White females, ages 16, 17, and 18. One senior served as a "peer buddy" in an after-school program for students with disabilities. The other two peer partners, a sophomore and a senior, had not previously served as peer partners. Nathan's facilitator recruited two peers in his Biology class. Both were 14-year-old White males in 9th grade. Neither reported any prior experience working with students with disabilities. Shortly after introducing the peer support intervention (after session 55), one of Nathan's peer partners moved to a different school.

Experimental Design and Procedures

I used a multiple-probe-across-participants design to examine the effectiveness of the peer support intervention and adapted peer support interventions for increasing social interactions. Probe sessions were balanced to ensure data collected across the days of the week. I used visual analysis of level, trend, and variability of social interactions to make phase change decisions.

Table 2

Peer Recruitment for Each Peer Support Arrangement

Focus student	Reasons cited for each peer recruited	Consult with focus student?	Did s/he agree to participate?
Samuel	1. Good social skills; academic performance; plays sports, talks to the focus student; general educator confirmed	Yes	Expressed interest, no consent returned
	2. Good social skills; academic performance; talks to the focus student; general educator confirmed	Yes	Expressed interest, no consent returned
	3. Good social skills; academic performance; general educator teacher recommended	Yes	Yes
Allen	1. Age/grade (same age as Allen); Allen's preference; good attendance; good social skills; academic performance; willingness to help others; sits near Allen; prior experience as a peer buddy; general educator confirmed	Yes	Yes
	2. Age/grade (same grade as Allen); good attendance; good social skills; academic performance; willingness to help others; general educator confirmed	Yes	Yes
	3. Age/grade (same age as Allen); good attendance; good social skills; academic performance; willingness to help others; general educator recommended (requested a 3rd peer partner)	No	Yes
Nathan	1. Good attendance; good social skills; academic performance; willingness to help others; sits near Nathan; general educator confirmed	Yes	Yes
	2. Good attendance; good social skills; academic performance; willingness to help others; sits near Nathan; general educator recommended	Yes	Yes

Phase changes from baseline to the peer support intervention phase occurred after a minimum of 5 data points and only when a stable or decreasing trend in social interactions was clear. After a clear demonstration of effect of the peer support intervention across a minimum of 5 data points, I conducted structural analyses to examine the effects of contextual variables on

social interactions within the context of the peer support arrangements. Structural analyses used an alternating treatments design to measure the effects of varying levels of contextual variables on levels of social interactions. (See the section on structural analysis for a description of the design and protocol.) To ensure no changes in social interaction occurred as a result of the structural analysis procedure, I collected additional data prior to introducing adaptations to the peer support intervention.

Baseline. Prior to introducing the peer support intervention, each student with autism received direct support as needed from his assigned adult support in the general education classroom. Although the general educator was responsible for delivering instruction to all students in the class, the adult assigned to each focus student implemented modifications or accommodations and supported participation in class activities. During this phase, facilitators provided support as they had done previously, without any additional guidance or training (see Figure 4 for occurrence of adult facilitation during baseline).

Peer support intervention. The peer support intervention consisted of facilitator training and development of a peer support plan, peer partner orientation, and ongoing adult facilitation. I adopted intervention procedures and materials from those used in a large-scale randomized control trial (Carter et al., 2016). I provided coaching to all facilitators throughout intervention phases.

Facilitator training. Each facilitator participated in an initial training lasting 1.5 to 2.25 hrs (M = 1.8 hrs). I provided didactic training, which consisted of oral instruction, guided discussion of needs specific to the student, peers, and class, and collaborative development of an individualized peer support plan. Facilitators for Samuel and Allen participated in individual trainings, while Nathan's facilitator received training along with a paraprofessional whom she

supervised. Each training closely followed printed manuals. The content included the goals of the intervention, strategies for recruiting peers, creating peer support plans, orienting and supporting peers, fading support, and the role of the intervention coach. Each facilitator received a binder, which included information from the training and supplemental materials (e.g., scripts for recruiting peers, sample peer support plans, examples of facilitation strategies; see Appendices B and C for sample training materials).

Peer support planning. Immediately after training, I collaborated with facilitators to develop a written peer support plan specific to the student and classroom in which they would implement the intervention. Each plan included the student's individualized goals, facilitation strategies for the adult support (e.g., highlighting similarities among the students, providing positive feedback for working together, redirecting interactions to peer partners), and support strategies for the peer partners (e.g., ensuring the student with disabilities has a role in group activities, encouraging interactions with other classmates, highlighting important information in notes or on a worksheet). Furthermore, each plan broke down strategies appropriate to each instructional format (e.g., whole group, small group, individual seatwork) used in the class. (See Appendix C for a sample peer support plan.) Each facilitator shared completed peer support plans with the general educator to solicit her input, make sure goals and expectations aligned with those of the rest of the class, and encourage ongoing communication between them.

Peer partner orientation. Facilitators delivered the initial orientation for all peer partners, which lasted 32 to 40 min (M = 37.3 min). These meetings occurred either during class at times designated by the general educator to avoid missing instruction or during students' free period. Although facilitators asked each student with autism if he wished to participate in the peer orientation meeting, all focus students declined. Facilitators reviewed topics according to a

written outline (see Appendix D), which included presenting (a) a rationale for peer support strategies; (b) background about the focus student (e.g., personal interests, academic support needs); (c) general goals of increasing involvement in classroom activities, increasing the number of peers with whom the focus student interacts, and decreasing reliance on adult support; (d) confidentiality and respectful language; (e) review and discussion of the peer support plan; and (f) guidance about when to seek assistance. I attended peer orientation meetings for all peer partners to ensure facilitators covered all topics outlined and to answer questions or problem solve as needed. While facilitators covered each topic sufficiently without prompting, all three facilitators asked whether they covered all relevant information before ending the meeting.

Facilitation of peer support arrangements. Following peer training, the focus students and/or peer partners changed seats to be in proximity to one another as needed. Facilitation of peer support arrangements included strategies such as modeling interactions, prompting students to greet each other and interact throughout the class, identifying opportunities for social interactions, encouraging the students to work together on assignments when appropriate, and reinforcing peer partners and students with disabilities for working together and interacting. To encourage students to work on shared activities, facilitators collaborated with general educators to ensure academic adaptations and modifications aligned with the tasks assigned to peer partners. Facilitators monitored their own use of facilitation strategies (e.g., ongoing monitoring of the peer support arrangement, ensuring shared activities, use of appropriate prompting and feedback, and support for interactions and conversation with peers) at least twice weekly using self-monitoring checklists provided in the intervention manual (see Appendix E).

Coaching. I served as a coach throughout intervention phases. Coaching occurred one to two times in the first week and continued once per week throughout the intervention. Initially,

coaching included modeling of facilitative behavior and in-the-moment feedback and prompting to the facilitator. To control for degree of coaching across participants, modeling and in-the-moment feedback occurred during the first three coaching sessions (i.e., two sessions the first week and one during the second week). Feedback during all subsequent coaching sessions was reserved for the beginning and end of class, unless facilitators solicited help during the class period.

Structural analysis procedures. Following introduction of the peer support arrangements and an initial demonstration of effect (i.e., at least 5 data points indicating a change in level or increasing trend in social interactions), I conducted a structural analysis for each participant. During each session, I collected data on the frequency of interactions to provide a more precise measure of social interactions without the risk of underestimation. This ensured differentiation across conditions could be observed in as few sessions as possible.

Developing hypotheses. First, the facilitator, general educator, and I collaborated to identify a list of contextual variables hypothesized to contribute to higher or lower levels of social interactions or account for some of the variability in the initial peer support data. Specifically, I asked facilitators and general educators to describe circumstances when the peer support arrangement seemed to be going very well (i.e., students were interacting consistently) and times when students struggled to maintain interactions. From their descriptions, we generated a list of contextual variables, such as the number of classmates in proximity, proximity of the facilitator, format of the task, or familiarity with materials. We excluded variables not feasible to control without substantial interference in the daily routine of the class, such as instructional format (e.g., whole-group instruction vs. small-group activities) and physical arrangement of the classroom (e.g., location of desks and work spaces). Next, we selected one

contextual variable anticipated to most likely affect the level of interaction in each peer support arrangement, and we identified two levels or dimensions of the variable to be evaluated. For Samuel, we chose to examine the effects of shared activities vs. solitary activities. The general educator and paraprofessional often assigned him alternative tasks when the rest of the class worked with materials (e.g., power tools) considered too difficult or dangerous for Samuel to use. Although frequently in proximity to his classmates, we hypothesized students interacted less during times when they were not working on the same or similarly aligned activities. For Allen, we examined the effects of working with one vs. two peers on levels of interactions. We hypothesized working with one peer would result in higher levels of interactions, as he would become disengaged in the activity or conversation more quickly when working with or sitting in a small group. For Nathan, we chose to examine the effects of peer attention vs. adult attention on levels of interaction. Specifically, we hypothesized pre-session peer attention would result in higher levels of interaction and adult attention would have an inhibitory effect on peer interactions. Although his facilitator and general educator frequently reminded him it was okay to chat quietly during class about the lecture or assignment, we observed fewer peer interactions when an adult checked in more frequently throughout the class period.

Structural analyses. To experimentally evaluate each hypothesized contextual variable, I used an alternating treatments design for each structural analysis. Sessions occurred over a 3-day period for each participant. I started each day with a condition different from the previous day and alternated conditions during each class period, ensuring a minimum of 2 min between each session. To minimize disruption, I coordinated all condition changes with the general educator.

I provided training to facilitators and peer partners on the structural analysis procedures. These trainings took 10-15 min and focused on (a) instructing facilitators and peers to respond

consistently to all social interactions across conditions (i.e., to keep the consequences of interactions constant) and (b) how peers would be cued to initiate interactions to control for the number of opportunities for students with autism to respond. During structural analysis sessions, each facilitator responded to initiations directed to her in a brief, neutral way (i.e., neutral tone and facial expression, brief responses). For example, if the student requested help with an assignment, the paraprofessional provided assistance as quickly as possible without drawing out the interaction, such as by using gestures and minimal language to identify the key words in the question or quickly directing the student to the appropriate place in the text. Peer partners followed the same guidelines for responding in a neutral way to the focus student's initiations. In addition, peer partners followed cues to initiate interactions with the focus student. I provided them with a limited list of brief, open-ended initiation statements (e.g., "How's it going?") to use during each session. During structural analysis sessions, all research team members stood at a distance, out of the line of sight of the student with disabilities, and peers were cued to initiate an interaction with the focus student at 1-min intervals to ensure a minimum of five opportunities for the focus student to respond during each 5-min session.

For Samuel's shared activity condition, the teacher or facilitator assigned him the same task (e.g., building a model of a bridge) as the peers seated at his table. For the solitary activity condition, Samuel was directed to work on a task aligned with the course content, but different from the task assigned to peers at his table, such as designing a floor plan. For Allen's small-group condition, he sat with two peer partners at the same table and worked on the assigned activity. For the partner condition, the group split up to work on activities in different areas of the class, leaving Allen at the table with only one peer partner. To control for peer preference, I alternated peer partners across conditions. Before each of Nathan's structural analysis sessions,

either a peer partner or adult (i.e., the facilitator or general education teacher) provided 60-90 s of attention (i.e., conversation about the class content, lecture, or assignment). Sessions started within 15 s after attention was discontinued.

I measured fidelity of structural analysis procedures across all sessions and planned for any session with less than 100% fidelity to be discontinued and/or dropped from the analysis. No sessions met this criterion. Therefore, the structural analysis results in Figure 1 reflect all sessions.

Structural analysis results and adapted peer support arrangements. In the second intervention phase, each peer support arrangement incorporated an extra component corresponding with structural analyses results. During this phase, all other aspects of the peer support intervention remained the same. Figure 1 shows structural analysis results for each participant.

Samuel's structural analysis indicated higher frequency of social interactions when students were assigned shared or aligned activities. To ensure aligned activities for Samuel and his peers, I provided coaching on ways to assign Samuel a role or job to allow him to participate in carpentry activities with his peers. Given frequent periods of no instruction, coaching also included strategies to encourage students to engage in leisure activities and side projects aligned with the content of the course. For example, Samuel had a project to construct a small-scale building made of popsicle sticks, following specific parameters. His facilitator encouraged him to get it out during downtime and to invite his peers to help him. This project was similar to a previous class assignment, which students appeared to enjoy.

Allen's structural analysis indicated higher frequency of interactions when working with one peer partner, rather than in a small group with two peers. Although the general educator

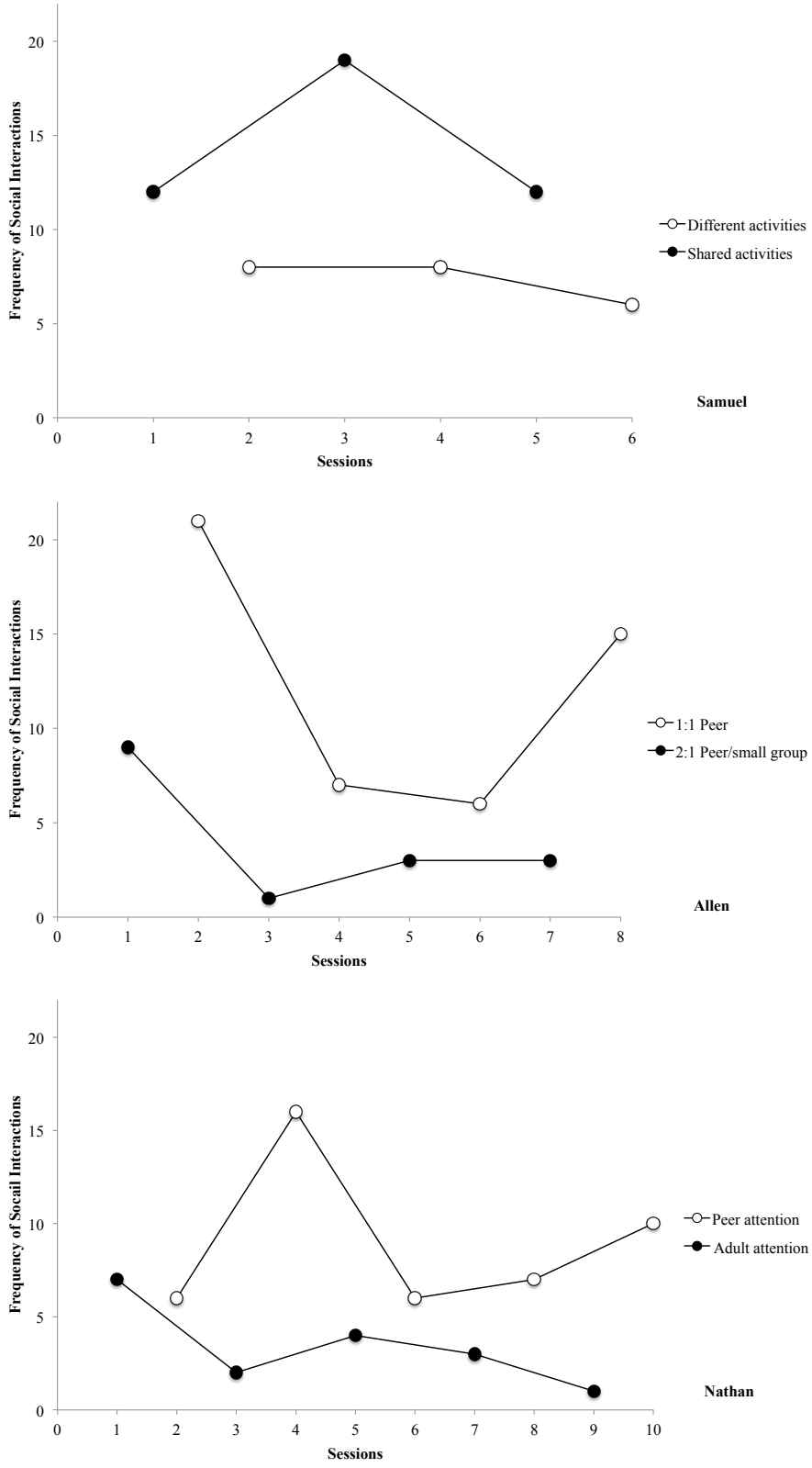

Figure 1. Structural analysis results for Samuel, Allen, and Nathan.

frequently assigned students to work in small groups, each day the facilitator ensured one peer took the lead in the peer support arrangement and told Allen who he would be working with at the start of class. If peer partners had to switch in the middle of the class period, a peer partner or the facilitator told Allen with whom he would be working for the remainder of class.

Nathan's structural analysis results indicated higher levels of social interactions during sessions immediately following peer partner attention. While Nathan and his peer partners would often engage in conversation during the peer supports intervention phase, this frequently occurred at the end of class as students packed up and waited for dismissal. Therefore, during the adapted peer supports phase, the facilitator encouraged his peer partner to engage in conversation with Nathan at the beginning of class and during breaks in the lecture and transitions occurring throughout the class period.

Treatment Fidelity

Observers collected data on treatment fidelity across all participants and phases using checklists. Checklists were completed at the end of observation sessions during baseline (92.7%), peer support (87.5%), and adapted peer supports (65.2%) phases. These checklists addressed the occurrence of adult facilitation (e.g., facilitating interactions, providing praise and feedback) and peer support behaviors (e.g., helping to participate in class activities, engaging in conversation, maintaining close proximity; see Appendix F). Table 3 summarizes fidelity checklists across participants and phases. I calculated overall fidelity as an average of the core components of the intervention (i.e., bolded items in Table 3). For Samuel, fidelity was 90.0% in the peer supports phase and 80.0% in the adapted peer supports phase. For Allen, fidelity was 94.9% in the peer supports phase and 91.7% in the adapted peer supports phase. For Nathan, fidelity was 93.8% in the peer supports phase and 88.9% in the adapted peer supports phase. In

Table 3

Summary of Treatment Fidelity Across Participants and Study Phases

Abbreviated fidelity indicators	Samuel			Allen			Nathan		
	BL	PS	Adapted PS	BL	PS	Adapted PS	BL	PS	Adapted PS
Average number of peer partners present	-	0.9	1.0	-	2.5	2.8	-	1.7	1.0
Peers are in proximity to and interact with focus student	**62.5%**	**90.0%**	**80.0%**	**83.3%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Sat next to each other	37.5%	70.0%	75.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Remained in proximity during out-of-seat activities	40.0%	71.4%	50.0%	42.9%	100.0%	N/A	33.3%	100.0%	N/A
Joined the same group during group activities	16.7%	87.5%	75.0%	62.5%	100.0%	100.0%	66.7%	100.0%	N/A
Peer partners interacted with the focus student	37.5%	90.0%	80.0%	58.3%	100.0%	100.0%	77.8%	100.0%	100.0%
Greeted the focus student	25.0%	60.0%	40.0%	8.3%	90.0%	100.0%	0.0%	12.5%	100.0%
Engaged in conversation	12.5%	90.0%	80.0%	58.3%	100.0%	100.0%	77.8%	100.0%	100.0%
Included the student in interactions with other peers	0.0%	60.0%	20.0%	8.3%	50.0%	50.0%	61.1%	50.0%	100.0%
Peers assisted focus student academically	**0.0%**	**80.0%**	**80.0%**	**58.3%**	**100.0%**	**100.0%**	**27.8%**	**100.0%**	**100.0%**
Helped the student participate in class activities	0.0%	70.0%	80.0%	58.3%	100.0%	100.0%	11.1%	100.0%	100.0%
Repeated or rephrased instructions for the student	0.0%	50.0%	60.0%	50.0%	100.0%	100.0%	5.6%	87.5%	100.0%
Appropriately prompted the student	0.0%	70.0%	80.0%	58.3%	100.0%	100.0%	0.0%	100.0%	100.0%
Provided appropriate feedback to the student	0.0%	40.0%	80.0%	50.0%	100.0%	100.0%	11.1%	100.0%	100.0%
Worked together on classroom activities	0.0%	80.0%	80.0%	50.0%	100.0%	100.0%	11.1%	100.0%	100.0%
Shared work materials	0.0%	80.0%	80.0%	50.0%	100.0%	66.7%	0.0%	100.0%	66.7%
Facilitator supported peers and student	**12.5%**	**100.0%**	**80.0%**	**8.3%**	**77.8%**	**66.7%**	**5.6%**	**75.0%**	**66.7%**
Facilitated interactions during class when appropriate	12.5%	100.0%	80.0%	8.3%	66.7%	50.0%	5.6%	75.0%	66.7%
Provided reminder/feedback to peer partners before, during, or after class	0.0%	30.0%	60.0%	0.0%	22.2%	50.0%	0.0%	37.5%	33.3%
Provided praise and feedback to students during or outside of class	0.0%	30.0%	60.0%	0.0%	33.3%	50.0%	0.0%	50.0%	66.7%
Structural analysis-based adaptations implemented as planned	-	-	100.0%	-	-	66.7%	-	-	100.0%

Note. BL=Baseline. PS=Peer supports.

addition to fidelity checklists, each observation included data collection of variables related to intervention fidelity. These are described in the following section on observational measures, and a summary of the data is includes in the results section

Observational Measures

Observers conducted direct observations 2-4 times per week, collecting data on all observational measures using a paper-pencil recording system and a vibrating digital interval timer set to 15-s intervals (see Appendix G for data sheets). Observational definitions aligned with those of Carter et al. (2016). The observational coding manual is included in Appendix H, including examples and non-examples of all behaviors. Observations began at the start of class and lasted the entire class period. The duration of class periods varied based on schedule changes, and observations averaged 38 min in duration (range, 20-49 min).

Dependent measures. Observers coded *social initiations* and *responses* using 15-s partial interval recording (i.e., 15-s observe, 15-s record), separately for the focus student, peer partners, and other classmates. *Social initiations* were any verbal or nonverbal (e.g., gestures, signs) behavior directed to or from the focus student and preceded by at least 5 s without interactive behavior with the same student. Observers coded initiations if the focus student interacted with a new peer, even when 5 s did not elapse since the last focus student or peer interaction. *Responses* were verbal or nonverbal communicative behaviors that directly followed (i.e., within 5 s) and corresponded to another student's initiations. Observers did not code social initiations or responses with other students with autism or severe disabilities, paraprofessionals, general educators, or any other adult. If the observer coded a social initiation and/or response during an interval, I coded a *social interaction* as occurring for the interval. Social interactions were coded separately for students with autism, peer partners, and other peers. During the

baseline phase, I coded all interactions by peers as *other peers* because peer partners were not identified until recruited by facilitators. Social interactions, initiations, and responses are reported as percent of intervals.

Observers also coded the *quality* of social interactions occurring during each 15-s observation interval using a 3-point, Likert-type scale. This subjective measure is an average of scores for *content* (i.e., 3=*appropriate*, 2=*neutral,* 1=*inappropriate*) and *affect* (i.e., 3=*positive,* 2=*neutral,* 1=*negative*). During each 15-s record interval, observers provided a summary rating of the content and affect of all interactions occurring in the 15-s observe interval, unless no interactions took place.

I defined *academic engagement* as the focus student looking at materials (e.g., textbook, worksheet, overheads) related to ongoing instructional activities; looking at the teacher; writing related to the assigned activity; following teacher directions; raising hand; or asking questions of the teacher, special educator, paraprofessional, or another student about instructional activities. I measured academic engagement using momentary time sampling recorded every 30 s and reported it as percent of intervals.

Observational measures of treatment fidelity. Other observational measures served as indicators of treatment fidelity. *Peer academic support* included behaviors designed to support participation or completion of academic tasks or assignments (e.g., prompting, providing information or feedback, praise for correct responses). I measured peer academic support behavior using 15-s partial interval recording (i.e., 15-s observe, 15-s record). *Proximity to peers* involved having a body orientation, distance (i.e., no more than 5 ft), and position by which the focus student could readily interact with at least one peer without disabilities. *Proximity to adult support* involved being physically located within 5 ft of the focus student. I used momentary

time sampling to measure proximity, recorded every 30 s and reported it as percent of intervals in which proximity was observed. In addition, observers coded facilitative behaviors of the paraprofessional or special educator trained in the peer support intervention, including *prompting providing information, reinforcing,* and *checking in*, using 1-min partial interval recording.

Instructional format. I used 30-s momentary time sampling to collect data on instructional format provided to the student with autism. Options included *whole group* (i.e., 8 or more student in a group, including the student with autism), *small group* (i.e., between 3 and 7 students, including the student with autism), *partners* (i.e., the student with autism working primarily with a peer), *independent work* (i.e., working primarily independently without the assistance of peers or adults), and *one-to-one instruction* (i.e., individual instruction provided by paraprofessional or teacher). *No instruction* occurred when no clear direction or expectation was provided or when no other instructional formats could be coded.

Peer comparisons. To estimate typical levels of social interactions and academic engagement, I used the same observational measurement system to collect normative data on a sample of peers from each participant's classroom. I conducted five peer comparison observations per classroom across the duration of the study. To ensure sufficient data to compare the effectiveness of the peer support intervention, I completed a minimum of three peer comparison observations prior to introducing the second phase change for each participant. Observers randomly selected peers without autism from those within close distance, coding one peer for the first half of the class period and another for the second half. I determined normative ranges of social interactions and academic engagement for each classroom by calculating ±1 *SD* of the mean of all peer comparison observations (cf., Hughes, Killian, & Fisher, 1996). I used peer comparison data to determine whether the level and quality of social interactions

approximated those of their classmates during intervention phases.

Inter-observer Agreement

Three masters-level research assistants and I conducted all observations. Prior to conducting observations, I required observers to reach a minimum of 90% reliability across three videos and three live practice sessions. I evenly distributed reliability sessions throughout the study and across phases (i.e., baseline, structural analysis, intervention). I calculated inter-observer agreement (IOA) as overall agreement, occurrence agreement, and nonoccurrence agreement. Overall agreement was calculated by dividing the number of intervals with agreement (i.e., both observers coded the presence or absence of the behavior) by the total number of intervals (i.e., agreements plus disagreements) and multiplying by 100%. Occurrence agreement was calculated by dividing the number of intervals with occurrence agreements by the total number of intervals with occurrence agreements and occurrence disagreements. Non-occurrence agreement was calculated by dividing the number of intervals with nonoccurrence agreements by the total number of intervals with nonoccurrence agreements and nonoccurrence disagreements.

Table 4 includes IOA for all variables. Overall, occurrence, and non-occurrence agreement was above 85% for all primary outcomes (i.e., social interactions, quality of interactions, academic engagement). Occurrence of proximity of adult support and non-occurrence of proximity to peer partners fell below 80% due to the low frequency of these variables across all three participants.

Social Validity

At the conclusion of the study, facilitators, general educators, peer partners, and students with autism completed questionnaires including 20-23 items, rated on a 5-point, Likert-type scale

(1=*strongly disagree*, 2=*disagree*, 3=*neutral*, 4=*agree*, 5=*strongly agree*; see Appendix I). For general educators and facilitators, items addressed topics related to the time required to

Table 4

Inter-observer Agreement (IOA) for All Observational Measures

Measure	Overall	Occurrence	Non-occurrence
Focus student interactions	99.3 (86.0-100)	97.7 (75.0-100)	99.4 (93.1-100)
Initiations	99.9 (98.1-100)	96.0 (0.0-100)	99.8 (93.4-100)
Responses	99.5 (94.3-100)	96.8 (66.7-100)	99.4 (95.0-100)
Peer partner interactions	99.9 (98.2-100)	97.8 (66.7-100)	99.8 (98.1-100)
Initiations	99.6 (97.0-100)	98.1 (88.0-100)	99.6 (97.4-100)
Responses	99.6 (97.2-100)	94.7 (50.0-100)	99.3 (96.0-100)
Other peer interactions	99.4 (94.0-100)	96.3 (60.0-100)	99.5 (96.0-100)
Initiations	99.7 (95.2-100)	95.7 (50.0-100)	99.7 (95.2-100)
Responses	99.6 (95.8-100)	95.3 (66.7-100)	99.5 (95.7-100)
Any peer interactions	99.6 (94.0-100)	98.1 (80.0-100)	99.6 (96.4-100)
Initiations	99.5 (94.0-100)	97.7 (75.0-100)	99.0 (75.0-100)
Responses	99.4 (94.3-100)	96.4 (66.7-100)	99.3 (92.0-100)
Any student interactions	99.6 (94.0-100)	98.6 (86.7-100)	99.4 (88.0-100)
Quality			
Content	100.0 (100-100)	100.0 (100-100)	100.0 (100-100)
Affect	96.8 (62.9-100)	95.6 (59.0-100)	97.0 (62.9-100)
Academic engagement	96.3 (76.0-100)	92.4 (30.7-100)	86.0 (0.0-100)
Measures of peer fidelity			
Peer academic support	95.8 (86.0-100)	84.9 (0.0-100)	94.1 (80.9-100)
Proximity to peer partners	97.4 (87.0-100)	93.9 (50.0-100)	73.8 (0.0-100)
Proximity to other peers	97.9 (90.0-100)	95.6 (75.0-100)	83.6 (0.0-100)
Measures of adult facilitation	99.6 (85.0-100)	99.2 (85.0-100)	99.8 (95.4-100)
Prompt	99.6 (83.0-100)	97.9 (83.0-100)	99.8 (95.4-100)
Reinforce	100.0 (100-100)	100.0 (100-100)	100.0 (100-100)
Provide information	100.0 (100-100)	100.0 (100-100)	100.0 (100-100)
Check in	100.0 (100-100)	100.0 (100-100)	100.0 (100-100)
Proximity to adult support	95.4 (82.0-100)	79.5 (0.0-100)	90.5 (42.8-100)
Instructional format			
Whole group	99.5 (84.8-100)	99.2 (84.8-100)	98.4 (60.0-100)
Small group	100.0 (99.0-100)	100.0 (100-100)	100.0 (99.0-100)
Partners	99.6 (84.8-100)	98.5 (84.8-100)	99.7 (84.8-100)
Independent work	99.6 (85.0-100)	97.1 (60.0-100)	99.9 (96.7-100)
1:1 instruction	100.0 (100-100)	100.0 (100-100)	100.0 (100-100)
No instruction	100.0 (100-100)	100.0 (100-100)	100.0 (100-100)
Gone from the classroom	100.0 (100-100)	100.0 (100-100)	100.0 (100-100)

Note. Cells display percentage of inter-observer agreement and ranges for each observational measure.

implement the intervention, their desire to continue using peer support arrangements with the focus student and other students with disabilities, benefits to the focus student and his peer partners, acceptability of the time and effort to participate in the structural analysis procedure, and utility of structural analysis results. Questionnaires for focus students and peer partners included items related to their desire to work together, benefits of the peer support arrangement for the focus student and peer partners, the time and effort required to participate, whether they would like to continue working together or participate in a similar peer support arrangement with other students, and whether they consider themselves friends. Nathan completed his form independently, while items were read aloud and explained as needed for Samuel and Allen.

CHAPTER 3

RESULTS

Figure 2 displays the effect of peer support arrangements and adapted peer support arrangements on the social interactions for focus students and their peers. Figure 3 displays academic engagement of students with autism. In both figures, horizontal gray bars represent normative levels based on peer comparison data for social interactions and academic engagement, respectively. Vertical gray bars in Figure 3 represent the percent of intervals with no instruction, during which academic engagement was coded as absent. Table 5 summarizes all observational measures across participants and study phases. Because observers may have coded the interactions of future peer partners as *other peer interactions* during baseline, results for the first intervention phase reference the percent of intervals with any peer interactions (i.e., peer partners and/or other peers).

Peer Support Arrangements

Prior to introducing the intervention, I observed stable or decreasing trends in baseline levels of interactions, which remained below normative rates for each classroom for the majority of baseline data points. The introduction of peer support arrangements resulted in an immediate increase in the level of social interactions for all participants, indicating a functional relation between peer support arrangements and social interactions.

Samuel. Baseline levels of Samuel's social interactions averaged 1.0% of intervals, and peers directed interactions toward him during 1.1% of intervals on average. Content of interactions was typically appropriate (M = 3.0), and affect was typically positive or neutral (M =

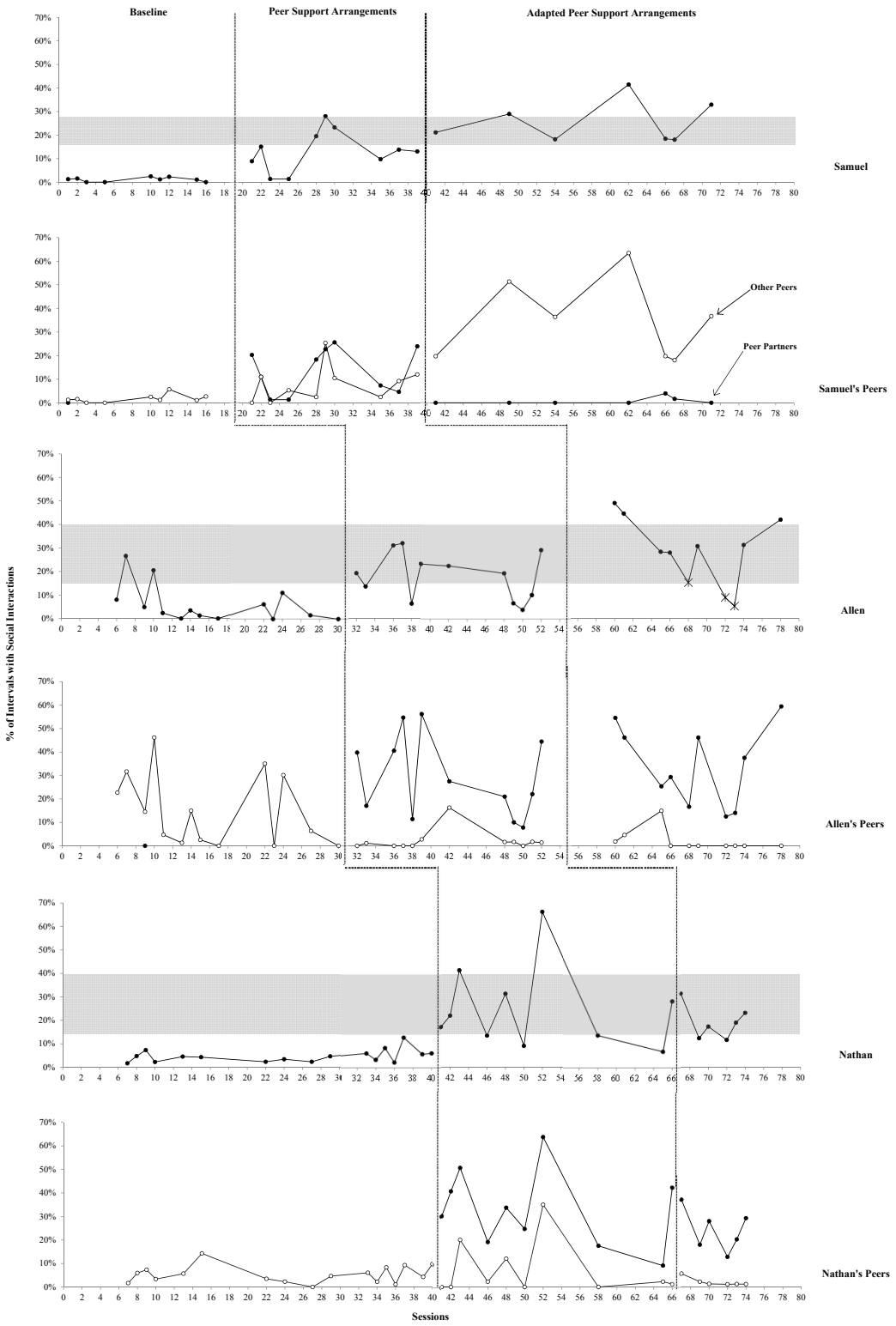

Figure 2. Social interactions of students with autism and their peers. Gray bars denote normative rates (i.e., 1 SD above and below the mean) of social interactions for each setting. Data points marked with an X in Allen's graph indicate low fidelity of the structural analysis-based adaptation.

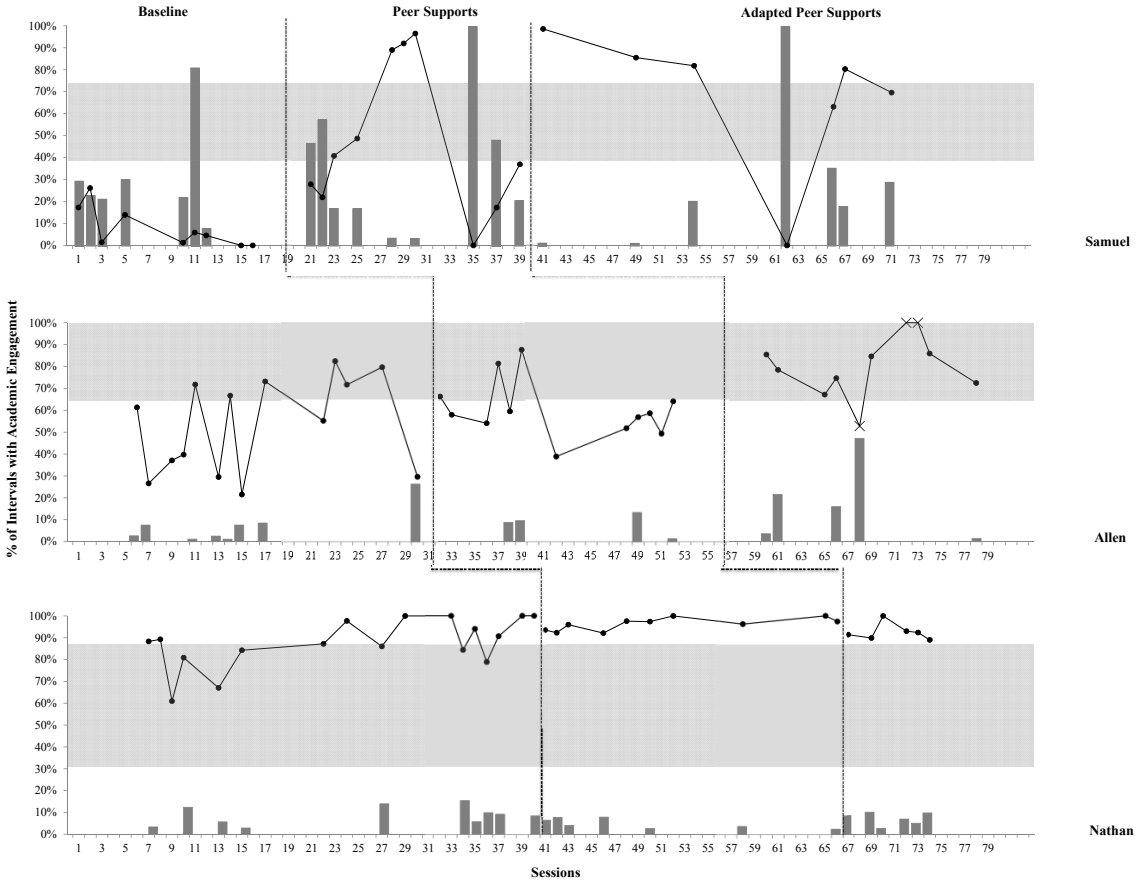

Figure 3. Academic engagement of students with autism. Horizontal light gray bars denote normative rates (i.e., 1 SD above and below the mean) of academic engagement for each setting. Vertical dark gray bars denote the percent of intervals in which *no instruction* occurred. Data points marked with an X in Allen's graph indicate low fidelity of the structural analysis-based adaptation.

Table 5

Observational Findings by Participants and Study Phases

	Samuel						Allen						Nathan					
	BL		PS		Adapted PS		BL		PS		Adapted PS		BL		PS		Adapted PS	
Measures	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Focus student interactions	1.1	0.9	13.4	8.7	25.6	9.1	6.1	8.2	18.1	9.9	22.8	13.2	4.8	2.8	24.9	18.0	19.2	7.4
Focus student initiations	0.6	0.9	6.2	4.7	11.4	2.2	0.3	0.7	0.6	0.9	2.5	3.4	2.0	1.7	2.1	2.7	2.9	3.0
Focus student responses	0.7	0.7	8.6	5.6	17.5	10.8	6.0	8.0	17.6	10.2	21.9	12.7	3.3	2.5	24.5	17.9	18.0	6.3
Peer partner interactions	-	-	13.6	9.6	0.8	1.5	-	-	29.4	17.2	31.5	16.9	-	-	33.2	16.6	24.2	8.9
Peer partner initiations	-	-	9.2	7.0	0.6	1.1	-	-	19.0	13.1	19.6	10.7	-	-	16.3	7.6	15.0	4.7
Peer partner responses	-	-	6.2	4.3	0.2	0.5	-	-	17.1	10.5	19.3	11.9	-	-	23.8	17.6	14.7	7.8
Other peer interactions	1.8	1.7	7.8	7.7	35.0	17.5	15.0	15.5	2.2	4.5	2.2	4.5	5.3	3.7	7.3	11.8	2.2	1.8
Other peer initiations	1.1	1.3	3.9	3.7	22.6	11.5	11.4	11.4	1.5	3.6	1.3	3.2	2.7	3.5	0.5	0.8	0.6	0.7
Other peer responses	0.8	0.9	4.3	4.4	17.7	9.4	6.4	9.0	1.2	2.5	1.3	2.6	3.0	2.0	8.4	13.3	2.0	2.0
Any peer interactions	1.8	1.7	18.8	12.2	35.7	16.8	15.0	15.5	30.2	17.6	32.7	17.2	5.3	3.7	33.6	17.2	24.4	8.7
Any peer initiations	1.1	1.3	12.5	8.2	23.0	11.2	11.4	11.4	19.9	13.6	20.5	11.1	2.7	3.5	16.8	7.6	15.6	5.2
Any peer responses	0.8	0.9	9.5	6.2	17.9	9.2	6.4	9.0	17.5	10.5	20.0	12.1	3.0	2.0	24.3	18.5	15.1	8.1
Any student interactions	1.8	1.7	21.5	14.0	38.9	16.6	15.1	15.5	30.5	17.6	22.8	11.7	6.2	3.9	34.0	17.2	25.1	9.3
Quality																		
Content	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0
Affect	2.5	0.5	2.8	0.2	2.8	0.3	2.6	0.3	3.0	0.1	3.0	0.1	2.5	0.4	2.9	0.2	3.0	0.1
Peer academic support	0.0	0.0	26.1	26.1	54.1	28.7	18.3	19.0	30.7	22.9	36.7	23.7	6.2	16.5	33.7	16.8	21.9	9.2
Academic engagement	7.8	9.2	47.1	34.1	68.4	32.2	53.2	21.7	60.4	13.4	69.4	16.9	87.6	11.3	96.3	2.8	92.6	3.9
Proximity																		
To peer partners	-	-	54.4	21.2	20.1	27.9	-	-	83.4	24.6	86.1	20.0	-	-	96.8	9.2	97.5	4.0
To other peers	42.2	41.2	59.5	19.8	86.6	12.0	67.7	38.0	45.0	37.9	36.8	36.2	99.6	3.2	97.0	7.8	97.9	3.5
To paraprofessional	15.8	16.1	13.1	23.5	28.9	29.6	66.8	29.2	18.3	21.7	16.5	21.1	14.2	17.8	15.9	24.2	12.5	13.9
Instructional format																		
Whole group	35.0	37.6	17.5	30.2	20.4	35.3	24.6	40.3	24.0	33.9	35.6	39.4	73.0	30.0	59.1	38.1	57.2	42.4
Small group	32.4	48.7	41.5	34.3	1.8	4.8	8.3	23.1	47.7	45.4	35.1	41.9	1.7	5.6	15.5	32.6	0.0	0.0
Partners	0.0	0.0	5.3	12.0	36.2	40.1	44.5	45.6	13.5	26.6	13.3	24.3	1.0	4.0	4.3	12.1	0.0	0.0
Independent work	8.5	25.6	0.0	0.0	12.3	18.7	18.5	36.3	12.0	26.4	8.4	20.7	19.1	32.9	17.6	34.5	35.7	43.6
1:1 (no peers)	0.0	0.0	4.3	13.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0
Gone from the classroom	12.9	4.5	8.6	4.7	8.5	10.7	6.3	6.3	6.2	7.8	8.3	8.1	3.7	13.2	0.0	0.0	0.0	0.0
Adult facilitation	2.0	3.6	14.6	5.8	17.9	9.5	0.7	1.5	2.7	3.5	4.5	5.5	0.4	1.7	2.2	2.7	1.6	1.9
Prompt	2.0	3.6	12.4	5.7	16.8	9.2	0.7	1.5	1.3	2.1	2.3	3.6	0.3	1.2	0.5	1.1	0.4	1.1
Reinforce	0.0	0.0	1.0	2.4	2.2	3.5	0.0	0.0	0.6	1.5	0.8	1.5	0.0	0.0	0.7	1.2	0.0	0.0
Provide information	0.0	0.0	0.8	1.7	1.2	2.2	0.0	0.0	0.9	1.7	1.4	2.2	0.0	0.0	0.7	1.2	0.0	0.0
Check in	0.0	0.0	0.5	1.0	1.0	2.7	0.0	0.0	0.4	1.0	1.0	1.9	0.1	0.6	0.8	1.7	1.6	1.9
No instruction	24.0	24.4	31.5	31.6	29.4	33.7	4.1	7.1	2.8	4.8	5.6	11.2	5.1	5.5	3.5	3.1	7.2	2.9

Note. Cells display percentage of intervals, except those for quality of interactions. BL=Baseline. PS=Peer support

2.5; range: 2.0-3.0). His academic engagement averaged 7.8% of intervals, consistently below levels of his classmates. Upon introduction of the peer support intervention, an immediate change in level for both social interactions and academic engagement occurred. After a return to baseline levels of social interactions, a coaching session focused on the importance of the facilitator being present from the start of class and strategies to facilitate social interactions resulted in an increase in social interactions. Overall during the peer supports intervention phase, Samuel engaged in social interactions during an average of 13.6% of intervals, and peer interactions increased to an average of 18.8% (13.6% for peer partners and 7.8% for other peers) during the peer support intervention phase. Average quality of interactions remained high for content (M = 3.0) and improved for affect (M = 2.8). In spite of a slight increase in the average percentage of no instruction from 24.0% during baseline to 31.5% during the first intervention phase, Samuel's academic engagement increased to an average of 47.1% of intervals.

Allen. During baseline, Allen's social interactions averaged 6.1%, with variability (SD = 8.2%). However, after observing a decreasing trend in social interactions, the introduction of peer support arrangements resulted in an immediate change in level and increasing trend. Social interactions increased to an average of 18.1% of intervals. In addition, peers directed interactions toward Allen during 30.2% of intervals on average (29.4% for peer partners and 2.2% for other peers), as compared to an average of 15.0% during baseline. Content of interactions remained appropriate (M = 3.0), and average ratings of affect improved from 2.6 to 3.0 on average. Allen's academic engagement, which averaged 53.2% of intervals during baseline, increased to an average of 60.4% of intervals. Furthermore, variability of academic engagement decreased from baseline (SD = 21.7%) to the peer supports phase (SD = 13.4%).

Nathan. For Nathan, levels of his social interactions remained below 10% during

baseline, averaging 4.8%. Peers interacted with Nathan during an average of 5.3% of intervals. Content of interactions was consistently appropriate (M = 3.0) and affect was typically positive or neutral (M = 2.5). Nathan's academic engagement was comparable to his classmates, averaging 87.6% during baseline. Introduction of peer support arrangements resulted in an immediate increase in level of social interactions. Improvement in the average level of social interactions (M = 24.9%) was accompanied by increased variability (SD = 18.0%). Peer interactions also increased to an average of 33.6% (33.2% for peer partners and 7.3% for other peers). The content of interactions remained appropriate (M = 3.0), and affect was more positive (M = 2.9). Nathan's academic engagement remained high throughout the peer support intervention phase (M = 96.3), exceeding normative levels.

Adapted Peer Support Arrangements

Increases in level of social interactions occurred with the introduction of the adapted peer support intervention in the first two tiers. However, levels remained comparable to the first peer support intervention phase for Nathan. Therefore, I was unable to establish a functional relation between structural analysis-based adaptations and improvements in social interactions. Similarly, I observed improvements in academic engagement for the first two participants and maintenance of high levels of academic engagement, above normative levels, for the third participant.

Samuel. For Samuel, the additional effort to align activities with those of his peers resulted in an increase in level and nearly double average social interactions for him (M = 25.6%) and his peers (M = 35.7%). Interaction quality remained high (M = 3.0 for content, M = 2.8 for affect). Prior to introducing this adaptation, the facilitator often directed his peer partner or another classmate to help him complete a modified or alternative task, resulting in removal of the peer as well as Samuel from the rest of the group. Enabling him to participate in aligned

activities with the rest of the class permitted Samuel to interact with any or all of his classmates, including those not directly assigned to work with him. Therefore, while a large decrease in peer partner interactions was observed from an average of 13.6% to 0.8%, interactions with untrained peers increased substantially from an average of 7.8% to 35.0%. Furthermore, Samuel's proximity to any peer (i.e., his peer partner and/or another classmate) increased from an average of 60.5% during the first intervention phase to 87.0% during the second, and academic engagement improved from an average of 47.1% to 68.4%. It is possible the increase in the interactions and support provided by other peers provided an opportunity for Samuel's peer partner to relinquish his role in the peer support arrangement, a pattern that started to emerge during the first intervention phase.

Allen. Identifying a peer partner to work with Allen at the start of class or each new activity resulted in an immediate increase in social interactions, followed by a decreasing trend. However, examination of fidelity data showed the structural analysis-based adaptation (i.e., assigned peer partner) was implemented during less than 30% of the class period during Sessions 68, 72, and 73. Averages across days in which the adaptation was implemented with fidelity (i.e., 65-100% for all other data points) show increases in average social interactions for Allen (M = 36.3%) and his peer partners (M = 42.6%), and high quality of interactions maintained. In addition, increases in academic engagement (M = 69.4%) occurred despite variability of fidelity of the structural analysis adaptation. However, average academic engagement across days with high fidelity of the structural analysis-based adaptation was higher (M = 78.4%) and less variable (SD = 7.3%).

Nathan. I observed a modest decrease in Nathan's social interactions from an average of 24.9% to 19.2%. Variability of social interaction also decreased by more than half during the

adapted peer supports phase (*SD* = 7.4%). These changes corresponded with decreases in peer partner interactions (*M* = 24.4%) and interactions with other peers (*M* = 2.2%). Quality of interactions remained appropriate (*M* = 3.0) with slight improvement in affect (*M* = 3.0). Nathan's academic engagement (*M* = 92.6%) remained consistently above those of peer comparisons. Of note are changes in instructional format in the adapted peer support intervention phase. As the average occurrence of independent work increased from an average of 17.6% to 35.7%, partner and small-groups activities decreased to 0%. Comparison of levels of social interaction during the adapted peer supports phase to those with similar instructional formats (i.e., whole group instruction or independent work for greater than 90% of the class period) during the first peer support intervention phase indicates a modest increase in Nathan's social interactions from an average of 16.2% to 19.2%. This improvement occurred amidst comparable levels interactions of peer partners (*M* = 25.0% and 24.2% for intervention phase 1 and 2, respectively) and other peer (*M* = 2.4% and 2.2% for intervention phase 1 and 2, respectively).

Adult Facilitation and Peer Academic Support

Adult facilitation and peer academic support behaviors are graphed in Figure 4 and summarized for each participant and phase in Table 5.

Adult facilitation. Adult facilitation during baseline remained low for all students. Facilitators relied exclusively on prompting, with the exception of Nathan's facilitator who checked in once. Although increases in facilitation occurred immediately after introducing the peer support intervention, levels varied across tiers and sessions. Samuel's facilitator averaged 14.6% of intervals with facilitative behaviors, mostly relying on prompting (*M* = 12.4%), infrequently reinforcing students' behaviors (*M* = 12.4%), providing information (*M* = 0.8%), or checking in (*M* = 0.5%). Allen's facilitator engaged in lower levels of any facilitation (*M* =

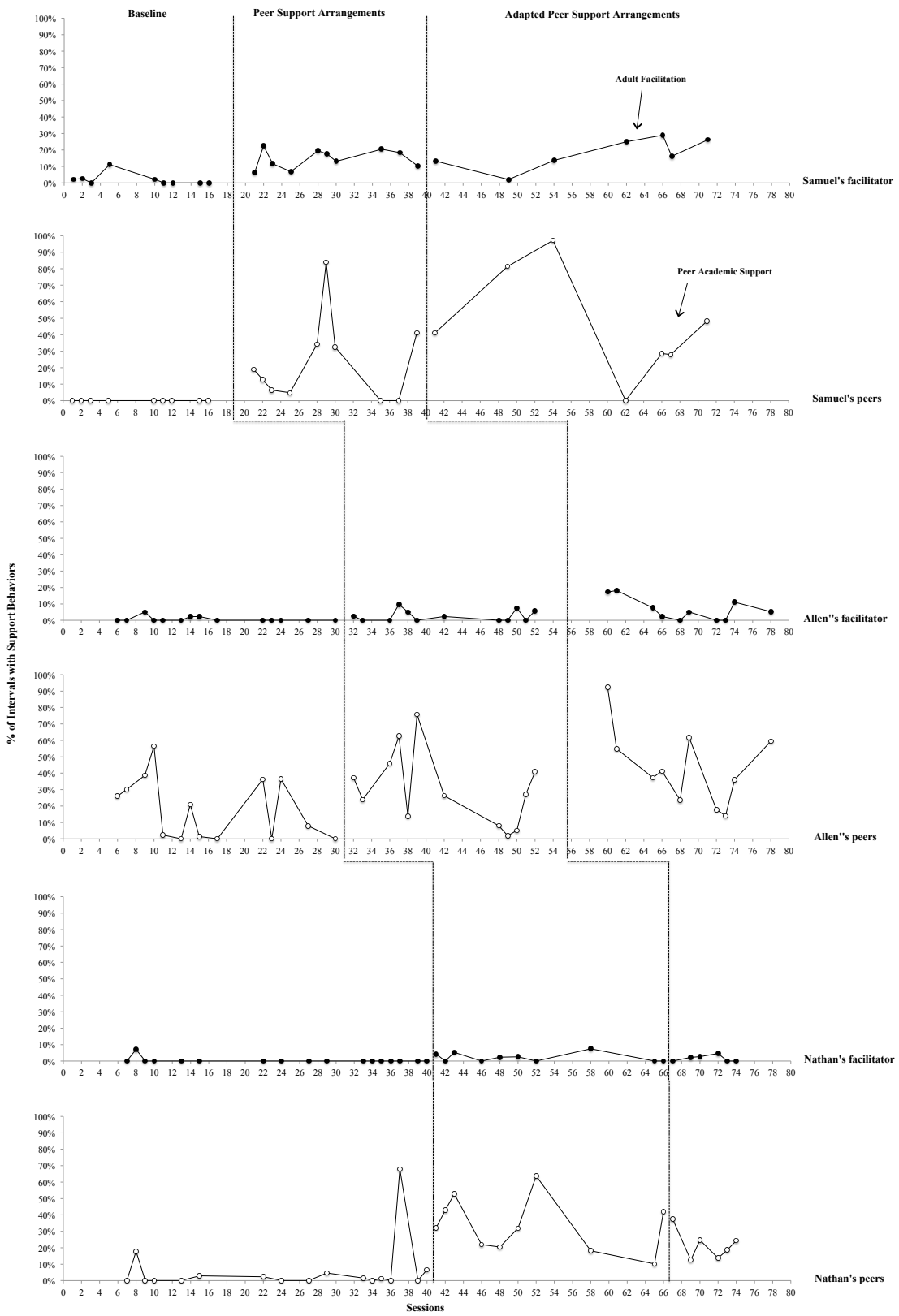

Figure 4. Adult facilitation and peer academic support provided for each student with autism.

2.7%), and she also relied more heavily on prompting (*M* = 1.3%). Nathan's facilitator

provided support during 2.2% of intervals on average, but relied on other methods of facilitation more readily, including checking in (M = 0.8%), providing reinforcement (M = 0.7%), and providing information (M = 0.7%).

During the adapted peer supports phase, levels of facilitation increased for Samuel (M = 17.9%) and Allen (M = 3.5%). This was expected for both peer support arrangements. Samuel's adaptation involved supporting him to work on the same activities as his peers, which provided more opportunities to support and encourage interactions and engagement with peers. The shift in support from his peer partner to other peers also required additional adult support, as the other peers did not have the same orientation or prior experience in this role. For Allen, the adaptation required the facilitator to prompt or check in with peer partners to ensure one of them was identified as the primary peer partner throughout the class period, adding at least one additional opportunity for facilitation during each class session.

Peer academic support. Peer academic support improved for all students during the first intervention phase. Samuel experienced an increase from 0% during baseline to an average of 26.1% during peer support intervention. During session 35, no instruction occurred for the entire class period, occasioning no opportunity for peer support. For Allen, peer academic support increased from 18.3% during baseline to an average of 30.7% during peer support intervention. Nathan's peer academic support increased from 6.2% during baseline to an average of 33.7%.

The introduction of adaptations to the peer support intervention resulted in a change in level of peer academic support for Samuel to an average of 54.1% across sessions in this phase. The teacher provided no instruction during session 62, providing no opportunity for peer academic support. For Allen, peer academic support increased slightly during the adapted intervention phase to an average of 36.7% of intervals. A decrease in peer academic support for

Nathan from an average of 33.7% to 21.9% coincided with changes in instructional format and corresponding decreases in peer social interactions.

Social Validity

Measures of social validity showed stakeholders' views toward the intervention and structural analysis were favorable. General educators and facilitators acknowledged the social and academic benefits for students with autism, thought it was an appropriate way to address the educational needs of a student with disabilities, and expressed a desire to continue using this strategy in the future (see Table 6). Facilitators noted they felt effective in their roles, able to use the strategies in the future, and willing to apply it with other students with disabilities. In addition, facilitators and general educators felt the assessment results were useful, the assessment process would be useful for other students, and it did not disrupt ongoing class activities. Although Samuel's general educator provided social validity scores lower than the others, he expressed concerns specific to the Carpentry class in which Samuel was enrolled (i.e., the small number of students enrolled, the limited selection of appropriate peer partners, high support needs of many students in the class). He felt the intervention would have been more successful and easier to implement if Samuel were enrolled in another of his Carpentry classes. Samuel's facilitator echoed these sentiments, but acknowledged the social and academic benefits to Samuel were substantial regardless of these issues.

Overall peers indicated feeling confident in their role, would recommend being a peer partner to other students, and would do it again in the future (see Table 7). All peers considered the student with autism to be a friend and felt their views about students with disabilities improved as a result of participation. The majority of peers also acknowledged social benefits gained from being a peer partner. All three focus students said they enjoyed working with their

Table 6

Facilitator and Teacher Perspectives on Acceptability of Interventions and Assessment

	Samuel		Allen		Nathan	
Questionnaire items	FA	GE	FA	GE	FA	GE
Overall, I enjoyed being in this project.	5	4	4	4	5	5
I feel I was effective in this role.	5	-	4	-	4	-
The student with a disability benefitted *socially* from having a peer support.	5	4	4	5	5	5
The student with a disability benefitted *academically* from having a peer support.	5	4	4	5	5	5
The peers without disabilities benefitted *socially* from being a peer support.	5	3	4	5	5	4
The peers without disabilities benefitted *academically* from being a peer support.	5	3	3	2	3	3
I am motivated to continue using this strategy.	5	3	4	5	5	5
The amount of time required to use this strategy was reasonable.	5	4	4	5	5	5
I would need ongoing consultation to keep implementing this strategy. *	1	3	2	2	2	2
Implementation of this strategy required considerable support from other school staff.	1	4	4	2	2	1
I would not be interested in implementing this strategy again. *	1	3	2	2	1	1
This strategy fits well within this classroom.	3	4	4	5	5	5
I understood the procedures of this strategy.	5	3	4	3	5	4
I would know what to do if I was asked to implement this strategy again.	5	2	4	4	5	3
The student with a disability has more friends as a result of this project.	5	4	4	4	4	4
This strategy was a good way to address the educational needs of the student with a disability.	5	4	4	5	5	5
This strategy negatively impacted other students in the class. *	1	3	2	1	1	2
I could use the strategies I learned through this project with other students.	5	2	4	5	5	4
I often use cooperative learning strategies with students in my classroom.	-	4	-	5	-	4
The peer support strategy would be feasible for me to implement if additional school staff were not in my classroom.	-	3	-	5	-	3
This strategy was a good way to address the educational needs of students without disabilities.	-	4	-	3	-	3
The amount of time required for record keeping with this strategy was reasonable.	5	-	4	-	4	-
Participation in the assessment required a considerable amount of time. *	1	-	4	-	2	-
The assessment process would be helpful for other students I work with.	5	3	4	5	5	4
The assessment results were useful to further understand the needs of the student.	5	4	4	3	4	3
The assessment procedure was disruptive to ongoing class activities	-	1	-	2	-	2

Note. FA = Facilitator. GE = General educator. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. *Negatively worded items on which lower scores indicate endorsement. Blanks (-) indicate the respondent was not asked the specific items.

Table 7

Peer Partner Perspectives on Social Validity

	Samuel		Allen				Nathan	
Questionnaire items	FS	P1	FS	P1	P2	P3	FS	P1
At first, I was excited to have/become a peer support.	4	4	5	5	4	4	4	5
I felt confident serving in this role.	-	4	-	5	5	3	-	4
I had enough help from a teacher or teaching assistant (i.e., paraprofessional) to work with my partner well.	5	5	5	5	5	4	4	5
This was too much work for me.*	2	3	1	1	1	2	2	2
It was easy or easier to get my own work done while part of this project.	5	3	5	3	5	5	4	4
The initial orientation meeting with a teacher/paraprofessional was helpful.	-	3	-	5	5	5	-	5
Other students in the class should also do this.	5	4	4	5	3	4	4	4
I would like to have/be a peer support again in the future.	4	3	5	5	5	4	4	4
I understand why the teachers thought peer supports would be helpful for me/my partner with a disability.	4	4	3	5	5	5	4	5
Our school should have more peer supports for students with disabilities.	5	4	3	2	5	5	4	4
My partner with disabilities benefited *socially* from having a peer support (e.g., talks more with peers, has more friends).	-	4	-	5	4	5	-	4
My partner with disabilities benefited *academically* from having a peer support (e.g., participates more in class, learns new skills).	-	5	-	5	4	5	-	3
I benefitted *socially* from having or being a peer support.	5	5	5	3	5	4	4	4
I benefitted *academically* from having or being a peer support.	5	5	5	3	4	3	3	3
I consider my peer partner or partner with disabilities to be a friend.	5	5	5	5	4	4	4	4
I spend time with my peer partner outside of class.	1	-	2	-	-	-	4	-
I enjoy coming to this class.	5	-	5	-	-	-	5	-
I would recommend being/having a peer support to my other friends.	5	4	4	5	3	3	4	5
I enjoy coming to school.	5	-	4	-	-	-	4	-
My views about students with disabilities have changed for the better.	-	5	-	5	5	5	-	4
I also spend time with other students who have similar disabilities at my school.	-	5	-	4	3	3	-	5
Overall, I enjoyed being in this project.	4	5	5	5	5	4	4	5

Note. FS = Focus student. P1-P3 = Peer partners. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. *Negatively worded items on which lower scores indicate endorsement. Blanks (-) indicate the respondent was not asked the specific items.

peer partners and would like to continue to do so, benefited academically and socially from working with peers, and considered their peer partners to be friends. Furthermore, social interactions and academic engagement of all three focus students more closely approximated those of their classmates when peer support arrangements were in place relative to baseline.

CHAPTER 4

DISCUSSION

Although students with autism are spending more time in general education settings, the need for effective strategies to mediate the social challenges faced by these students remains. The many barriers faced by students with autism, including reliance on adult support, often limit meaningful social and academic participation with their classmates without disabilities. I examined the effectiveness of peer supports as an alternative means of supporting social and academic participation for students with autism in high school general education classes. In addition, I addressed the role of structural analysis as a means of further refining this intervention to meet students' needs in each educational context. Findings of this study demonstrated peer supports were an effective model for improving social and academic outcomes, and showed further improvements can result from adaptations based on structural analysis data. These findings extend literature in a number of ways.

First, peer support arrangements were an effective means of improving social and academic outcomes for high school students with autism. Prior to this and the previous pilot study, only three studies examining peer support arrangements included students with autism (Brock et al., 2016; Brock & Carter, 2015; Carter et al., 2016). For students who experience substantial social challenges inherent to their diagnosis, strategies designed to enhance social interactions and opportunities to work with their peers without disabilities are sorely needed. For many high school students with autism, the tendency of educators may be to prioritize academics, resulting in diminished attention on the development of social relationships.

(Kucharczyk et al., 2015). The benefits of peer support arrangements have potential beyond increasing peer interactions and academic engagement. These interventions may provide social opportunities for modeling, practice, and embedded instruction of specific social skills, and by encouraging ongoing social connections with the same peers throughout the semester, they may set the stage for peer relationships and friendships to develop. Moreover, these social benefits are achieved without negative impact to academic engagement with the general education curriculum.

Second, structural analysis was an effective means for detecting the effects of varying dimensions of contextual variables on social interactions. It also can be conducted during ongoing activities in general education classrooms using peers. Increased enrollment of students with autism in general education classes necessitates formative assessment practices be applicable and feasible for use in these settings. An advantage to conducting structural analyses in the natural environment may include ensuring the presence of all relevant and influential environmental factors. Conducting this type of assessment in another, more controlled setting could arguably lead to results not representative of the functional relations present in the general education classroom (Hanley, Iwata, & McCord, 2003). The contextual variables influencing social interactions in a peer support intervention may not have the same effect if the peer support arrangement is removed to a more controlled setting. For example, the influence of instructional format on Nathan's social interactions was apparent. A structural analysis conducted in a setting absent of whole-group instruction would likely have produced different, less applicable results.

Furthermore, demonstrating the feasibility and effectiveness of conducting structural analyses using peer partners in general education classrooms has implications for its use with other peer-mediated interventions and in other inclusive settings. For example, structural analysis

may be useful to test the effects of contextual variables on academic outcomes in a peer tutoring intervention. These results also have implications for the application of structural analysis to inform peer-mediated interventions in other school settings, such as peer networks conducted during lunch or afterschool peer buddy programs. Structural analysis findings for each participant in this study highlight the way different contextual factors relevant to individual students and setting can influence the same outcomes within peer support arrangements. While it is probably no surprise different students respond to the same intervention in different ways, the clearly differentiated patterns of social interactions in each structural analysis reinforces the argument for the importance of effective formative assessment practices to guide the individualization of social interventions.

Third, by comparing the effects of peer support arrangements with and without structural analysis-based adaptations as part of my experimental design, I am able to attribute the positive effects to the refinements made to peer support arrangements. Structural analysis-based adaptations to peer support arrangements resulted in clear improvements in social and academic outcomes for the first participant and an immediate increase in social interactions for the second participant—an improvement which remained high across days in which the facilitator implemented adaptations with fidelity. Furthermore, comparison of the days with mostly whole-group instruction and independent seatwork, showed improvements in Nathan's social interactions with structural analysis-based adaptions in place. These findings provide support for the use of structural analysis to further refine peer support arrangements. To date, the role of formative assessment to individualize or refine peer-mediated interventions is insufficiently represented in the social intervention literature (Huber & Carter, 2016). Moreover, this literature provides limited direction regarding which formative assessment methods are effective, where,

and with whom. A formative assessment practice cannot be deemed effective simply because the information or data it yields is conclusive. It is necessary for research to clearly test adaptations made based on formative data to establish its effectiveness. The current study illustrates the use of single-case design for this purpose, by allowing the necessary comparison between unaltered interventions to those with individualized adaptations. By going beyond demonstrating structural analysis as a means of establishing differentiated levels of social interactions to testing the effects of data-based adaptations, I provided further support for its utility as a formative assessment for peer support interventions.

Fourth, the addition of observational measures of fidelity offers insight into the influence of adult facilitation and peer academic support may have on outcomes. The standard of peer support fidelity in the current literature is not entirely clear. Of the four peer support intervention studies including observational measures of adult and peer support behaviors, three studies included observational measures of adult facilitation repeated across sessions throughout baseline and intervention. Carter et al. (2011) used a checklist to measure whether any adult and peer support behaviors occurred at anytime during each observation. This data provided insight into the types of supports used by each before and during intervention and allowed authors to detect a shift in support from adults to peers. However, the measure was not sensitive enough to detect changes in level of day-to-day facilitation. Brock and Carter (2015) found even low frequency facilitative behaviors resulted in improvements in the social interactions of three participants with severe disabilities, but not for a fourth participant whose paraprofessional provided similar levels of facilitation. Findings from Brock et al. (2016) indicate adult facilitation of peer support arrangements may lead to higher levels of peer support behavior and subsequent increases in social interactions for students with disabilities. Authors also noted the

level of facilitation appeared to vary based on student characteristics, specifically communication needs. Similarly, I observed higher levels of facilitation for students with greater communication and support needs. In addition, the degree of facilitation varied more substantially for students whose assigned tasks and instructional format changed greatly from day to day than for the student whose class expectations remained fairly consistent. However, the relationship between adult facilitation and peer academic support was not as clear. Although peer partners provided academic support to students with autism when the peer support intervention was in place, variability of peer academic support did not appear to coincide with variability of adult facilitation in a consistent manner across tiers. In some instances increased facilitation occurred on days when academic support was lower; while in other instances, the opposite was true. This finding was not surprising given that adults may fade facilitation when peers take the lead in supporting the focus student, while more adult facilitation may be needed when peers are not as confident in their supportive role.

Although, these points provide support for the flexibility of peer support implementation—a strength of the intervention—they also highlight the need for a better understanding of how varying levels of fidelity may (or may not) impact effectiveness. The reasons why the flexibility of peer support arrangements may appeal to educators are the same reasons the components are likely to look different across students and classrooms. Therefore, establishing the critical components (i.e., those which must be implemented with consistency and fidelity) is essential. Evidence from the current study indicates this might not be straightforward. All three participants were in close proximity to peers for a portion of each class period throughout baseline. Although proximity to peers is necessary for peer support arrangements to be successful, it is insufficient on its own. Similarly, the presence of peer interactions and

academic support during baseline did not have the same impact on Allen's social interactions as when the peer support intervention was in place. It is also necessary to determine if certain elements of peer support arrangements are more important for certain types of students or settings. For example, the role of peer academic support may look different for students, like Nathan, who are expected to perform at an academic level similar to their peers in core academic classes. Understanding how this and other intervention components should be implemented based on student, peer, and facilitator characteristics, as well as classroom contexts, would ensure practitioners draw upon the flexibility allowed by this intervention in the most advantageous way possible in each case.

Fifth, all stakeholders reported overall positive attitudes toward the peer support intervention and structural analysis, providing strong social validity for both. Facilitators and general educators acknowledged the social and academic value of peer support arrangements for students with autism and expressed motivation to continue using this intervention with these and other students. Students also expressed a desire to continue working together and recognized social benefits, such as improved attitudes toward students with disabilities and friendships, not directly targeted as part of the intervention. In addition, facilitators and general educators endorsed structural analysis as a useful and reasonable tool to inform adaptations to peer support interventions.

Evidence of continued motivation to use peer support arrangements after implementing it daily throughout a semester is encouraging. The increased likelihood of continued use, paired with the limited time requirement for training and ongoing implementation, support this intervention as a promising investment for educators and schools. Levels of social interactions and academic engagement of all participants, which more closely resembled normative rates

during each intervention condition, bolster the social validity of peer support arrangements and the structural analysis-based adaptations further.

Recommendations for Practice

Findings from this study have important implications for general educators, special educators, and others responsible for supporting the inclusion of students with autism in general education classrooms. Findings of the current study mirror those of previous research. Without purposeful planning and support, students with autism rarely interact and participate with their classmates in general education classrooms. Sitting or working in proximity to peers, as all three students in the current study did during baseline, is not enough. Peer support arrangements offer a guide for planning ways peer can support participation, identifying opportunities for social interactions, and encouraging the development of social connections. Furthermore, the minimal time commitment for training, ongoing facilitation, and documentation make this a viable option for school staff, such as paraprofessionals and special educators.

This study also provides support for structural analysis as a promising approach to formative assessment. The limited research on formative assessment procedures for social interventions provides little guidance for educators seeking to use data-driven methods to individualize interventions. This study provides strong support for the application of structural analysis in the context of a peer-mediated social intervention as a means of informing adaptations specific to each student. Its appropriateness for low-rate, prosocial behaviors lends itself nicely for assessing social interactions of students with autism, which may occur infrequently or not at all. Furthermore, demonstrating the use of structural analysis in the context of existing peer support arrangements provides an model of how the number of contextual variables can be reduced to make this assessment method a viable option in complex settings,

like general education classrooms.

Limitations and Directions for Future Research

Several study limitations suggest directions for future research. First, although I expanded the inclusion criteria to include participants with autism with all levels of intellectual ability, only one participant had an average IQ and was seeking a regular education diploma. Demonstration of the effectiveness of peer support arrangements for one student with autism in one of the core academic classes required to earn a high school diploma is encouraging. However, the current research is insufficient to establish the effectiveness of peer support arrangements for students with autism who have higher academic and social skills. For these students who are more likely to be enrolled in the core academic classes required for a high school diploma, a different approach to implementing peer support arrangements may be required for a number of reasons. Dense academic content and reliance on lecture and whole-group instruction may necessitate careful consideration of how or when peer academic support and social interactions are encouraged. Also, adult support may be limited for these students who are less likely to have a one-to-one adult assigned to them. Although it is encouraging Nathan's special educator was able to facilitate the peer support arrangement while supporting the academic needs of 11 other students, it raises questions about whether others would be able to do the same. Given the many ways their support needs may differ from the participants typically targeted by the peer support research, future research should explore the implementation of peer support arrangements (a) for students with autism who do not have significant cognitive impairment, (b) in high school core academic classes, and (c) without extensive adult facilitation.

Second, although structural analysis proved an effective means of comparing the influence of different contextual variables on social interactions, the confirmation of hypotheses

generated through collaboration between facilitators, general educators, and myself raises a question about the necessity of testing those hypotheses experimentally. This finding is unlike my previous pilot study, in which structural analysis results did not align with hypotheses consistently. Structural analyses in the earlier study tested the effects of combinations of the varying levels of two contextual variables (e.g., high vs. low facilitator proximity and seating with or slightly apart from whole class). Testing more than one contextual variable introduces the possibility of interaction effects, which is a possible reason some hypotheses were not confirmed. However, given a simpler approach targeting one contextual variable, a relevant question is whether the structural analyses were necessary or if interviews with facilitators and general educators might have been sufficient. Additional research examining the effectiveness of similar interview methods could be conducted with a similar design, comparing the effects of unaltered interventions to those with adaptations based on hypotheses generated by interviews. Questions about whether time or effort is saved by skipping the experimental step of the structural analysis must also be addressed. Arguably, it may take longer to test hypothesized peer support adaptations as part of the experimental design than a structural analysis, which took less than 3 days for participants in this study.

Third, low fidelity of the structural analysis-based adaptions during three sessions created some difficulty identifying the effects of Allen's adapted peer support intervention. The goal of the current study was to determine the effectiveness of structural analysis-based adaptations by comparing peer support arrangements with and without adaptions. However, failure to properly control for levels of fidelity across intervention conditions obscured the effects of the adaptation. Ensuring high fidelity of the structural-analysis component across all sessions during the second intervention phase may have resulted in a clearer demonstration of effect for Allen. Efforts to

achieve high fidelity might not have been complicated or difficult. Some options may include explicit explanation or training of the adapted component for the facilitator, an additional meeting with peer partners to explain the adaptation and the rationale behind it, increased frequency of coaching upon introducing the adaptation, or adding the adaptation to the facilitator's self-monitoring sheet. This raises an important point for future research comparing the effectiveness of an intervention to an adapted intervention. Due to the likelihood varying levels of fidelity may impact outcomes, efforts to maintain consistent fidelity of unchanged intervention components across both intervention phases and to ensure high fidelity of adapted elements during the adapted intervention phase are necessary to improve the likelihood effects (or non-effects) can be attributed to the adaptation. Future research should ensure precise measurement of fidelity and supports (e.g., training, coaching, self-monitoring systems) to ensure fidelity remains high.

Fourth, I had similar difficulty interpreting the effects of Nathan's adapted peer support intervention due to the effects of different classroom instructional formats on levels of social interaction. This challenge raises questions about the best way to evaluate the effects of adaptions when uncontrollable contextual factors, such as instructional format, have a substantial impact on outcomes. One option might be to conduct the structural analysis sessions during only times of the most common instructional format to ensure results would more likely represent the student's behavior during the majority of time spent in class. However, if study data collection is not limited to only days or times with that same instructional format, effects of structural analysis-based adaptations may not be apparent. I conducted the majority of Nathan's structural analysis sessions (3-10) during whole-group instruction and independent work, the predominant instructional formats on most days. Comparing levels of social interactions during days with a

high percentage of those instructional formats showed the improvements expected from the peer support adaptation. It is unclear whether the structural analysis results and the related adaptation would apply to outcomes in the same way in other instructional contexts. Therefore, caution should be taken when considering the application of structural analysis results obtained during one instructional context, like lecture, in a different one, such as science lab or small-group project. A second solution may involve conducting separate structural analyses during different instructional formats. Doing so introduces the option to test the effects of different contextual variables during each type of instruction (e.g., Stichter et al., 2009). Future research exploring these and other possible solutions for addressing contextual variables that are influential but not readily controllable would provide much needed guidance for conducting structural analyses in natural settings.

Fifth, I conducted all structural analyses for all participants, but it is unclear who of the school staff would implement or oversee this type of assessment. Although little is known about the implementation of structural analysis by anyone other than researchers and clinicians, support for implementation of functional analyses by classroom teachers and special educators is documented in the research (e.g., Bloom, Lambert, Dayton, & Samaha, 2013; Kodak, Fisher, Paden, & Dickes, 2013). Given the simplicity of the peer partner training and alternating treatments design testing only two conditions, the feasibility of training special educators or general educators to conduct structural analyses similar to those in the current study is reasonable. In fact, this type of assessment may require less coordination and planning if conducted by the classroom teacher, who has more control over lesson plans and the activities students will be doing each day. However, the practical issue of who should and can implement structural analyses in classrooms should be considered as part of future research.

Conclusion

The efficacy of peer support interventions for improving social and academic outcomes for students with disabilities has substantial and growing support in the literature. The current study adds and extends the current research by exploring the role of formative assessment to individualize this evidence-based intervention—a consideration overlooked in the current literature on peer-mediated social interventions for students with autism. Although structural analysis shows promise as a means of informing further refinement of peer support interventions, more research is needed to determine effective and efficient applications of this assessment method in complex environments like general education classrooms.

Appendix A

Peer Partner Recruitment Questionnaire

PEER PARTNER RECRUITEMENT QUESTIONNAIRE

Peer Partner Name (Initials only): _____

Did you know this peer before you asked him or her participate? Yes / No

Did you consult with the student with autism? Yes / No

Did you consult with the general education teacher? Yes / No

Check all factors contributing to your decision to recruit this peer:

- ☐ Age/grade level
  - Same age/grade level
  - Older/higher grade level
  - Younger/ lower grade level
- ☐ Gender
  - Same gender
  - Male
  - Female
- ☐ Student with autism expressed his/her preference
- ☐ Class attendance record
- ☐ Social skills
- ☐ Academic skills
- ☐ Willingness to help others
- ☐ S/he has other class(es) with my student
- ☐ Friend of a peer who agreed to participate
- ☐ Already sits near my student
- ☐ Other:

  _____
  _____
  _____

Did this peer agree to participate (returned consent forms) ? Yes / No

Appendix B

Example Facilitator Training Materials

Facilitation strategies for promoting interactions among students....

Strategy	**Examples of what school staff may say**
Modeling ways to interact	"Jasmine would be better able to play this game if you would show her how to match her cards." "How does this game work? Oh, I see. You need to match the green cards to the green cards and put the red ones with the red ones"
Highlighting similarities	"You and Eric might want to compare your essays, each of you have had similar experiences." "Wow! You both like country music. Todd just went to a concert; you should ask him about it." "I heard Monica say that she also wanted to see that movie. Maybe you could go together."
Identifying varied strengths and differences	"It sure works great when everyone in a group is good at doing different things. How did each member help get your project done?" "You and Carlos will make great book report partners! You have a talent for writing, and Carlos has a talent for drawing. Together, you should end up with a super project!"
Teaching interaction skills	"Randy, let's practice how you could call a friend on the phone and invite him to go to a movie." "John isn't looking. I don't think he heard you. You could ask again. Make sure he sees you." "What is another way that you could ask Patrick to borrow his ruler?"
Interpreting behaviors	"Mark, you talk aloud during math because it helps you think through the equations, right?" "That is usually a sign that Sarah is feeling a little anxious." "When Brent hits his hand on the desk, he is letting us know that he is frustrated. He is working hard to learn other ways to let people know what he is feeling."
Redirecting interactions to students with disabilities	"Instead of asking me how Mark is doing, why don't you ask Mark himself?" "If you want to know how Jack is, just ask him yourself. Just make sure he can see you when you ask." "I don't know. He's right here if you want to ask for yourself."
Redirect interactions to peers without disabilities	"See if you can get John to help you with this problem." "Why don't you ask Sam that question instead?" "Anita might be willing to check to see if your answers are correct." "Hmmm… I'm not sure what you should do next. Why don't you ask your classmate what the assignment is?"
Asking peers to help	"Mary, will you please help Brian with his worksheet?" "If you point to and read the question, he can keep his place and answer." "Would you be willing to be his partner and read out loud to him?"
Physical proximity	"Brian, why don't you go and sit with your lab group?" "Hmm…the group is about to start and you are still way over here." "Is everyone close enough to be involved?" "Uh, guys, I think you are missing someone…"

Possible Strategies for Peers

Some possible ways peers can interact with the student with a disability include:

- Sit next to the student during class
- Talk to the student
- Pass out papers with the student
- Share notes with the student
- Highlight important information provided in class for the student
- Brainstorm answers to questions together
- Invite the student to join a group during group work activities
- Make sure the student receives a role in the group
- Ask the student how s/he is doing with an assignment
- Ask the student a question such as "what number are we on?"
- Share jokes with the student
- Walk with the student to the next class
- Help the student organize assignments and class materials
- Remind the student how to follow classroom routines
- Encourage interactions with other classmates, when appropriate
- Help check the accuracy of assignments and class notes
- Paraphrase lectures or rephrase key ideas
- Help the student self-manage his or her learning
- Offer additional examples of concepts or ideas
- Demonstrate how to complete a problem
- Highlight important information on a worksheet
- Review course concepts with the student
- Motivate and encourage the student during difficult assignments
- Help the student to "fit in" by learning social norms
- Remind the student to use his or her communication book or device (if appropriate)
- Redirect the student when off task
- Share advice
- Share class materials
- Read aloud a section of an assignment or text
- Reinforce communication attempts
- Explain how to do certain aspects of an assignment

As you can see these are ways any student might interact with peers during class.

Possible Facilitation Strategies for Facilitator

Some possible strategies you can use as the facilitator to encourage peer interactions in the classroom in
(also see facilitating strategies handout on page12 for more examples of each strategy):

- Model ways students can interact with one another that facilitate peer interaction and decreases "tea
  behavior
- Highlight similarities among students
- Identify varied strengths and differences
- Teach interaction skills to students
- Interpret behavior for peers
- Redirect interactions to the student with disability
- Redirect interactions to peers without disabilities
- Ask peers to help the student with specific tasks
- Have students sit next to each other
- Provide positive feedback to groups for working together

Appendix C

Example Peer Support Plan

The Biology class is a great place for Brad to work on goals related to developing social and conversational skills, as well as expanding his typing and writing skills. Below are some ideas for how Brad might become more involved in class activities during Biology, as well as some ideas for how the peers at Brad's table could support him.

At the beginning of class....

Brad could…	Peers could…	The facilitator could…
• Talk quietly with his peers (when it is okay with the teacher) • Pass out worksheets or other materials to the class (if there are any that day) • Listen and respond to Ms. Hale as she does attendance • Boot up his laptop, if he will be taking notes in class	• Ask Brad about his day or upcoming school events • Help Brad pass out any worksheets • Make sure Brad has all of the same materials for class, such as a book, worksheets, lab materials, etc. • Help Brad get out his notebook, pen, paper, etc. for class	• Try to draw some of the peers at the table into conversation with Brad—you may have to do some modeling or give them some ideas of things they could ask about or prompt Brad to ask questions of his peers • Make sure Brad has the same materials as his classmates, such as a book, any worksheets, paper, pencil, lab materials, etc. • Look through the materials quickly to see if there are any things that could be adapted readily

When there are lectures or whole group instruction...

Brad could…	Peers could…	The facilitator could…
Listen to Ms. Hale as she presents information to the class • Quietly ask his peers questions about the material Ms. Hale is presenting • Take notes by typing important specific key words or phrases that are being written down by a peer (preferably) or the facilitator • Copy by hand those same key words or phrases with the facilitator's help or highlight notes • Turn off/on the lights when Ms. Hale is using the overhead projector	• Make sure Brad has all of the same materials for the activity as they do • As you are taking your own notes, copy down on a separate piece of paper some of the important words or ideas from the class discussion; Brad can then type these as his own notes or copy them down with the facilitator's help. Write fairly large so Brad can see clearly. • Periodically check to make sure Brad is doing okay with typing or writing his notes • Occasionally lean over and quietly summarize a key point or interesting fact for Brad, or ask him simple questions that help him follow along • Encourage Brad with lots of positive feedback such as "Wow, you take really good notes!"	• Make sure Brad has the same materials as his classmates • Always brainstorm ways Brad can be engaged in the discussion: Can he answer a question? Can he share an idea? • Help Brad to take modified notes by typing key words/ phrases on the laptop (preferred) or writing them out by hand • Encourage Brad to look at Ms. Hale or the whiteboard as instruction is taking place • Let the peers know when they are doing a great job interacting with or supporting Brad • Prompt Brad to ask his peers to double check his notes

When there are small group or lab activities...

Brad could…	Peers could...	The facilitator could…
• Listen to Ms. Hale as she presents instructions to the class • Participate in the small group or lab activity • Ask peers for help during his part of the activity	• Make sure Brad has all of the same materials for the activity as they do • Give Brad opportunities to make choices about or give input into the activity. • Even if Brad can't do all of an activity, he can probably still do a part of it. • Encourage Brad with lots of positive feedback such as "That was a great answer!"	• Make sure Brad has the same materials as his classmates for the activity • Always brainstorm ways Brad can be engaged—even in small ways—in the activity: Can he mark the group's answers on the worksheet? Can he be asked his opinion about an answer? • Give peers ideas for questions they can ask Brad or ways they can involve him—think creatively! • Let the peers know when they are doing a great job supporting Brad • Give Brad examples of questions he can ask his classmates

When there is independent seatwork...

Brad could…	Peers could…	The facilitator could…
• Listen to Ms. Hale as she presents instructions to the class • Work with the facilitator to finish the worksheet or other activity • When other peers are done, ask them for help completing his work	• Before beginning your own work, make sure Brad has all of the materials he needs for the activity • When you are finished with your own work, check in to see if Brad could use some help finishing his own work or help double check his answers • Encourage Brad with lots of positive feedback such as "Awesome, you got the answer to number ten!"	• Make sure Brad has the same materials as his classmates for the activity • Work with Brad on completing the activity in a modified way. Can Brad tell you the answer if you read it to him? If you gave him the answer, could he practice typing or writing it down on the worksheet? • Is there an alternative activity Brad could complete? • Let the peers know when they are doing a great job supporting Brad

At the end of class...

Brad could…	Peers could…	The facilitator could…
• Talk quietly with his peers (if everyone's work is completed) • Collect any materials for Ms. Hale • Put away his things • Shut down his computer if he was taking notes in class	• Ask Brad about his day, what he is doing after school, or upcoming events • Help Brad put away his things • Walk with Brad to or part way to his next class	• Make sure Brad has the same materials as classmates • Try to draw all peers at the table into conversation with Brad—you may have to do a little modeling to get things started

Appendix D

Initial Peer Orientation Checklist

Meeting Checklist

Facilitator:_____Focus Student:_____

Date:_____Peer Support(s):_____

Return this completed form to your intervention coach.

- ❑ Rationale for peer supports strategies
- ❑ Background about focus student
- ❑ General goals
- ❑ **Confidentiality and respectful language**
- ❑ **Expectations specific to the classroom (drawing from Peer Support Plan)**
- ❑ Peer support strategies relevant to the student including communication system (if applicable), promoting class participation, promoting interactions with classmates and student motivation and feedback
- ❑ Guidance on when to seek assistance from educators or paraprofessionals
- ❑ Additional roles and responsibilities for peer supports:

- ❑ Questions or concerns raised by peer supports (write these below):

Appendix E

Facilitator Self-monitoring Sheet

Student's name: _____ Date: _____

FACILITATOR MONITORING AND FEEDBACK SHEET

GOALS:

1) _____
   _____
   Did you work on this goal today? ☐ Yes (give praise) ☐ No (give feedback)
2) _____
   _____
   Did you work on this goal today? ☐ Yes (give praise) ☐ No (give feedback)

BEGINNING ☐ **MONITORING** – Are the students talking to each other? ☐ **PRAISE-** What are the peers doing well? What is something that [name] likes about them? ☐ **SHARED WORK-** Are the students working on the same assignment?	**PRAISE:**
MIDDLE ☐ **MONITORING** – Are the students talking to each other? ☐ **PRAISE-** What are the peers doing well? What is something that [name] likes about them? ☐ **SHARED WORK-** Are the students working on the same assignment?	**PRAISE:**
END ☐ **MONITORING** – Are the students talking to each other? ☐ **PRAISE-** What are the peers doing well? What is something that [name] likes about them? ☐ **SHARED WORK-** Are the students working on the same assignment? ☐ **FEEDBACK** – How can the peers improve? Think about the goals for this Peer Support Arrangement. **Provide feedback toward the end of every class period.** [Name] would really like it if you_____. [Name] could do _____ with you, so he would rely on me a little bit less. One way to encourage [name] to talk to you is to _____. Did anything happen today that you have questions about? Is there anything I can do to help you to work with [name] better?	**PRAISE:** **FEEDBACK:**

Appendix F

Treatment Fidelity Checklist

Peer Support Weekly Meeting Checklist

Student: _____ School: _____
Facilitator: _____ Coach: _____ Date: _____

Peer Supports Present: _____

Circle Y (yes) or N (no) based on whether or not these behaviors occurred during the observation.
Complete one time per week and provide to your intervention coach.

				Less than 25% of the time	Approx. 50% of the time	75% of the time or more
1. **Y N**	Are peers supports in **close proximity** to the student during class?			1	2	3
	Y N		Do the students sit next to each other?	1	2	3
	Y N	N/A	Do the students remain in close proximity during out-of-seat class activities?	1	2	3
	Y N	N/A	During group activities, do the students join the same group?	1	2	3
	Other notes about proximity? _____					
When does proximity occur during class (circle all that apply):			Beginning Middle End			
2. **Y N**	Are peers supports **interacting** with the student in class?			1	2	3
	Y N		Do they greet the student (e.g. "Hi" or "see you later")?	1	2	3
	Y N		Do students engage in conversation?	1	2	3
	Y N		Do peer supports include the focus student in interactions with other peers?	1	2	3
	Other notes about interactions? _____					
When does proximity occur during class (circle all that apply):			Beginning Middle End			
3. **Y N**	Are peer supports assisting the focus student **academically**?			1	2	3
	Y N		Do the peer supports help the student participate in class activities?	1	2	3
	Y N		Do peer supports repeat or rephrase instructions for the student?	1	2	3
	Y N		Are peer supports appropriately prompting the focus student?	1	2	3
	Y N		Do peer supports provide appropriate feedback to the focus student?	1	2	3
	Y N		Do students work together on classroom activities?	1	2	3
	Y N		Do students share work materials?	1	2	3
	Other notes about academic assistance? _____					
When does proximity occur during class (circle all that apply):			Beginning Middle End			
4. **Y N**	Are **you (facilitator) supporting** peer supports and the target student?			1	2	3
	Y N		Do you facilitate interactions during class when appropriate?			
	Y N		Do you provide reminders/feedback to peer supports before, during, or after class?			
	Y N		Do you provide praise and feedback to students during or outside of class?			
	Y N		Where there times when students appeared to need additional support but did not get it?	1	2	3
	Other notes about supporting students? _____					

SA additions:

Appendix G

Classroom Observation Data Collection Sheet for Students with Autism

PARTICIPANT DATA SHEET

Date: _____ Page: 1 2 3 4 5 6 7

ID code:_____ Class: _____ Primary/Secondary Observer: _____/ _____

Persons in the Classroom:
General educators: ____/ _____ Special Educators : _____/_____
Other Adults: _____/_____ Students: _____/_____
# of Peer Supports Present: _____

Instructional Format Codes:
WhlGrp = 8+
SmllGrp = 3-7
Prtnrs = 1 SWD, 1 Peer
Indp = only SWD
1:1(no peers) = SWD + instructor
No Instruct = no instruction/instruction unclear

Para Facilitative Behaviors
P = Prompt
R = Reinforcement
I = Information provided
C = Check in

Bell		Partial Interval						Momentary time sampling						Partial Interval	
	Interval	SWD Interaction	Peer Support Interaction	Other Peer Interaction	Content	Affect	Peer Acad. Support	Academic Engagement	Proximity to peer supports	Proximity to other peers	Proximity to Para	SA-Adaptations	Instructional Format (circle one)	Para Facilitative Bx	Content of Para Facilitation
	1	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	2	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	3	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	4	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	5	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	6	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	7	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	8	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	9	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	10	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	11	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	12	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	13	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	14	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	15	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	16	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	17	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	18	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	19	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	20	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	21	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	22	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	23	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	24	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	25	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	26	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	27	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	28	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	29	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	30	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	31	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	32	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	33	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	34	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	35	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	36	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	37	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	38	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	39	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	40	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	41	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	42	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	43	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	44	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	45	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	46	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	47	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	48	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	49	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	50	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	51	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	52	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	53	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	54	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	55	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	56	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	57	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	58	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	59	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	60	I R	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
Observation Totals:													WG:	P:	A:	
Interaction Totals:													SG:	R:	S:	
Total Intervals:			Gone:										Part:	I:		
Observer Notes:											Total Intervals:		Ind:	C:		
													1:1			

Classroom Observation Data Collection Sheet for Peer Comparisons

PEER COMPARISON DATA SHEET

Date: _____ Page: 1 2 3 4 5 6 7

ID code: _____ Class: _____ Primary/Secondary Observer: _____/_____

Persons in the Classroom:
General educators: ____/____ Special Educators: _____/_____
Other Adults: _____/_____ Students: _____/_____
# of Peer Supports Present: _____
PC # 1 M / F Ethincity: _____ PC # 2 M / F Ethincity: _____

Instructional Format Codes:
WhlGrp = 8+
SmllGrp = 3-7
Prtnrs = 1 SWD, 1 Peer
Indp = only SWD
1:1(no peers) = SWD + instructor
No Instruct = no instruction/instruction unclear

Para Facilitative Behaviors
P = Prompt
R = Reinforcement
I = Information provided
C = Check in

Bell		Partial Interval					Momentary time sampling						
	Interval	PC Interactions	Other Peer Interaction	Content	Affect	Peer Acad. Support	Academic Engagement	Proximity to peer supports	Proximity to other peers	Proximity to Para	Instructional Format (circle one)	Para Facilitative Bx	Content of Para Facilitation
	1	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	2	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	3	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	4	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	5	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	6	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	7	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	8	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	9	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	10	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	11	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	12	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	13	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	14	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	15	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	16	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	17	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	18	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	19	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	20	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	21	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	22	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	23	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	24	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	25	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	26	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	27	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	28	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	29	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	30	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	31	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	32	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	33	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	34	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	35	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	36	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	37	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	38	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	39	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	40	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	41	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	42	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	43	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	44	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	45	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	46	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	47	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	48	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	49	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	50	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	51	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	52	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	53	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	54	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	55	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	56	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	57	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	58	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
	59	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1	P R I C	A S
	60	I R	I R	3 - 2 - 1	+ N --	Y N	Y N	Y N	Y N	Y N	W S P In 1:1		
Observation Tot											WG:	P:	A:
Interaction Total											SG:	R:	S:
Total Intervals:											Part:	I:	
Observer Notes:											Ind:	C:	
											1:1		
										Total Intervals:			

Appendix H

Behavioral Definitions, Examples, Non-examples, and Codes

Student with Autism and Peer Interaction Behaviors

- **Initiations (I)**: verbal or nonverbal (e.g., gestures, signs) behavior directed toward a peer without a disability that is preceded by at least 5 seconds without interactive behavior with the same peer. Circle **I** on the data sheet if the behavior occurred during the interval.
    - Examples:
        - A peer says to the focus student, "Hey, let's go!"
        - A peer asks a group of students, including the focus student, "Are any of you coming to the dance tonight?"
        - The focus student waves to a peer, who is looking down and does not respond.
        - The focus student raises his hand to initiate a "high five" with a peer.
        - The focus student makes a comment toward a group of classmates.
    - Non-examples:
        - The focus student is talking aloud toward the entire class but the initiation is not clearly directed toward any specific peers.
        - A peer is talking to the teacher and the focus student is looking or smiling at the peer.
        - A peer passes a worksheet to the focus student's hands without looking.
        - The focus student starts scripting lines from a movie, not directed at peer.
        - The focus student asks the paraprofessional what the peer is doing.

- **Responses (R)**: verbal or nonverbal communicative behavior that directly follows and correspond to a peer's or the focus student's initiation within 5 seconds (if more than 5 seconds, code as an initiation); emotional response to a comment (e.g., facial expressions, laughter) that are not accompanied by a verbal or nonverbal communication are excluded. Circle **R** on the data sheet if the behavior occurred during the interval.
    - Examples:
        - Tim (peer) says "hi"; student with autism waves within 5 seconds.
        - A peer asks the student, "What type of music do you like to listen to?" The focus student turns on her communication device and activates a message, "Lady Gaga."
        - A peer asks the student, "What do you like to do on the weekend?" The focus student responds, "It is snowing outside."
    - Non-examples:
        - Tim (peer) says "hi"; student with autism waves 10 seconds later.
        - During a group discussion involving the focus student and three peers, the focus student turns to a fourth peer who is not involved in the conversation and asks, "Did you see that movie?" (initiation from the focus student)
        - A peer laughs at the focus student's comments while the focus student is still talking.

Academic Engagement and Proximity Measures

- **Academic Engagement (Y/N)**: looking at materials (e.g., textbook, worksheet, overheads) related to ongoing instructional activities, looking at the teacher, writing related to the assigned activity, following teacher instructions/directions, raising hand, or asking questions of the teacher, paraprofessional, or another student about instructional activities
    - Examples:
        - Working with a peer or paraprofessional on an assignment using adapted materials
        - Following large-group instructions in a slower pace
        - Listening to the same lecture as the rest of the class.
    - Non-examples:
        - Moving around the classroom during instructional activities
        - Looking around the room or staring "off into space"
        - Not paying attention to a teacher lecture (i.e., not looking at the teacher, writing, or writing)
        - Disrupting others
        - Talking to peers when he/she is not supposed to
        - Waiting for instructional materials
        - Completing other activities unrelated to the class theme/unit for the day (unless assigned by the teacher)

- **Proximity to Peers (Y/N)**: body orientation, distance, and position of the focus student and at least one peer that allows easy access for interaction with the focus student (i.e., no more than 5 ft)
    - Examples:
        - Peer sitting across from the student at a small table
        - Student with autism sitting at a desk in rows next to other students (within 5 ft)
        - Student with autism working with a group at a lab table; peers come and go gathering materials but at least one peer is nearby
        - Peer standing behind the student with autism in line
    - Non-examples:
        - Student with autism is sitting at a table with the paraprofessional at the back of the room
        - Student with autism is sitting at desk with his/her back to nearby peers
        - Student with autism is sitting at a desk in the middle of the room; peers occasionally walk by

- **Proximity to Adult Support (Y/N)**: distance of target student and adult support (i.e., paraprofessional or special education teacher assigned to support the student with a disability; excludes the general education teacher) that allows easy access for interaction with the focus student (i.e., no more than 5 ft)
    - Examples:
        - Student with autism is sitting at a table with the paraprofessional at the back of the room

        - A special educator is standing behind the focus student during a large group lecture.
    - Non-examples:
        - Paraprofessional approaches to give the student with autism a quick direction and immediately walks away to help another student
        - Paraprofessional is working with another student with his/her back turned toward the focus student.
        - Paraprofessional is monitoring the focus student from across the room.

Instructional Format

- **Whole group instruction (WhlGrp):** The focus student, along with 7 or more students (i.e., 8 or more total students in the large group), is receiving ongoing instruction primarily from a teacher or paraprofessional (or a co-teaching arrangement). If a paraprofessional is supporting the student with disabilities to participate in large group activities, code as large group (not 1:1 adult).
    - Examples:
        - Teacher lecturing to the entire class including the student with autism
        - Paraprofessional working with the student with autism in a group of 8 students
        - General educator teacher directs the whole class to gather materials.
    - Non-examples:
        - Paraprofessional is working with the student with autism at the back of the room while the general educator teacher lectures to the rest of the class
        - Student with autism working with a group of 4 peers at a lab table
        - Student with autism is playing a game on the computer while the rest of the class is listening to the lecture

- **Small group instruction (SmllGrp):** The focus student is working cooperatively with 2 to 6 other classmates on a class project, task, or assignment (i.e., between 3 and 7 total students in the small group). The small group may be directly taught or facilitated by a teacher, paraprofessional, or peer.
    - Examples:
        - Student with autism working with a group of 4 peers at a lab table
        - Two peers offer work with the student with autism on the math assignment.
    - Non-examples:
        - Student with autism and 3 peers are working at table on independent seatwork.
        - See examples for other instructional categories

- **Partners (Prtnrs):** The focus student is **primarily** working with only 1 other peer. At this time, the focus student may or may not receive support from a paraprofessional. 1:1 peer tutoring or peer support arrangements should be coded as 1:1 Peer.
    - Examples:
        - One peer is paired with the student with autism on a lab assignment
        - A peer is assigned to support the student with autism to complete an

activity
    - Non-examples: See examples for other instructional categories

- **Independent work (Indp):** The focus student is **primarily** working independently on tasks assigned by the teacher or the paraprofessional, ***without*** the ongoing assistance of peers or paraprofessional. Occasional, brief help from a peer or an adult is okay and should still be coded as Independent Work. Ongoing or regular help from a peer would be considered 1:1 peer. While students are working on their individual assignments, the teacher may move around, check students' individual progresses, and provide intermittent instructions or feedback to individual students and/or the entire class.
    - Examples:
        - The focus student is given an assignment by the paraprofessional to complete while the rest of the class listens to the lecture.
        - Student with autism is taking a test, along with the rest of the class.
        - Student with autism is working on an assignment; paraprofessional is monitoring and occasionally prompting and praising the student.
    - Non-examples: See examples for other instructional categories

- **1:1 instruction (1:1(no peers)):** The focus student is **primarily** working with an adult (paraprofessional or general educator) on his or her own.
    - Examples:
        - The paraprofessional and Student with autism are working at a separate space in the classroom
        - The paraprofessional is providing instruction to the Student with autism at a table with other peers, but the peers and student with autism do not engage in the activity together.
    - Non-examples: See examples for other instructional categories

- **No Instruction (No Instruct):** The focus student has not been assigned any tasks or assignments, has completed assigned activities and is given "free time," or is undergoing a long transition from one context/activity to another context (e.g., changing from large-group instruction in one classroom to small-group instruction in a different classroom, leaving the classroom, etc.). In essence, the student is not expected to be doing any specific class-related work during this time.
    - Examples:
        - The teacher is taking attendance, no other instruction or task assigned
        - The focus student is sitting at desk at the beginning of class waiting for the teacher to arrive in the room or to begin class,
        - Student with autism is finished with work and needs another assignment to move on.
    - Non-examples: (See other instructional grouping categories)

Interaction Quality

- **Content**:

  Appropriate (3): The overall content of the student's peer interactions was similar to the interactions of other students in the class and was appropriate to the class context and the

student's age (e.g., the focus student was talking about school events during free time).
Neutral (2): The content of the student's peer interactions was a mix of appropriate and inappropriate topics and conversations.
Inappropriate (1): The content of student's peer interactions was mostly dramatically different from the interactions other students had in the class, or was neither age-appropriate nor class context-related.

- **Affect:**
  Positive (+): Both the focus student and peers enjoyed the interaction exchanges as indicated by their positive affect (smiles and attentive body language).
  Neutral (N): Most of the interaction exchanges between the focus student or peers were accompanied with neither positive nor negative affect.
  Negative (-): Either the focus student or peers showed negative affect during interaction exchanges (e.g., angry, verbal/physical aggression, displeased).

Peer Academic Support

- **Peer academic support:** any behavior designed to support participation or completion of the academic task at hand; includes prompting (verbal, gestural, textual) academic responses or engagement, managing materials related to the task at hand, asking or answering relevant questions, monitoring academic responses, sharing materials, praise and feedback, discussion of content related to the assignment, providing information, rephrasing directions or questions, checking in.
  - *Examples:*
    - Peer partner points to a section of the textbook to help the student find an answer to a question.
    - A peer asks the student to identify what materials he'll use for the assigned class project.
    - Peer directs the student to wash his hands before beginning the cooking lesson.
    - Peer allows the focus student to copy her notes during lectures.
    - Focus student is drawing a picture and the peer redirects the student back to the assigned task.
  - Non-examples
    - Peer partner assists the student with an assignment from another class
    - The students are playing Uno during downtime and the peer tells the focus student that it's his turn.
    - Peer partner responds to the focus student's a question about a Math test during World History.

Facilitator Support Behaviors

- **Prompt (P):** Facilitator encourages or suggests a way for the focus student to interact with peer without severe disabilities. Facilitator encourages or suggests a way for peer(s) and/or focus student to work together on class activities.

- *Examples:*
    - Facilitator prompts focus student to greet peer by pointing to the peer pantomiming waving hello.
    - Facilitator suggests to student with autism, "Why don't you ask Helen about what she did last night?"
    - Facilitator points to symbol on AAC device to prompt focus student to answer a question.
    - Facilitator says to peer, "Maybe after the lecture, you could explain to Sarah in a few sentences what it was about."
    - Facilitator suggests to focus student, "Why don't you ask Justin to program in these words into his iPad so he can use them in class?"
- *Non-examples:*
    - Facilitator says to focus student, "Why don't you go sit down?" and focus student goes over and greets David. (Prompt was not to greet the student)

- **Reinforce (R):** Facilitator praises the focus student and/or peer for social interactions (verbally or with gestures), or facilitator praises the peer(s) and/or focus student for the way they are working together on class activities
    - *Examples:*
        - Facilitator says to focus student and peer, "It looks like you two are getting along great!"
        - Facilitator says to peer, "You're really doing a great job giving Evan enough time to respond to you using his device."
        - Facilitator gives focus student a thumbs up when he greets a peer.
        - Facilitator says to focus student and peer, "I really like how well you two are working together!"
        - Facilitator says to peer, "That was really smart to think of helping Marty outline his paper so he could go back and fill in the information."
        - Facilitator says to focus student, "You and Kevin are working together really well today! I am proud of you."
    - *Non-examples:*
        - Facilitator walks by focus student and pats him on the back, but not clearly in response to anything he said or did.

- **Provide information (I):** Facilitator provides information to student with autism or peers that might help improve interactions. This includes information about how the focus student and/or peers can better communicate, interpretation of the focus student's behavior, sharing

information with peer about focus student's interests, and possible conversation topics. This differs from a prompt, because the facilitator is providing information that will be helpful in the future rather than simply giving directions.
    - *Examples:*
        - Facilitator says to peer, "He might not understand you. If you speak more slowly, he might be able to understand you better."
        - Facilitator suggests to student with autism, "Maybe you could wait a little longer for Deborah to answer you."

- **Check-in (C):** The facilitator communicates with peers and/or the focus student to discuss their role in the peer support arrangement, including if they are comfortable in their roles, or if they would like assistance from the peer.
    - *Examples:*
        - Facilitator asks the peer after peer has been working to focus student on a worksheet, "How have things been going?"
        - Facilitator says to peer, "You look frustrated. Is there something I can do to help?"
        - Facilitator independently initiates conversation with peer about an issue.

- **Academic (A):** Circle if the content or purpose of any of the above facilitative behaviors was to support the student to work together or discuss topics related to academic tasks.

- **Social (S):** Circle if the content or purpose of any of the above facilitative behaviors was to support the students to interact socially.

Appendix I

Social Validity Forms for Students with Autism, Peer Partners, Facilitators and General Educators

Social Validity Survey for Students with Autism

Peer Support Student Feedback Survey

Student: _____ School: _____ Semester: _____

Thank you for being a peer support! We want to know your thoughts about the project. Please read each of the following statements and **circle** the answer that best reflects your views. This information will help us improve the project experience for future students.

1.	At first, I was excited to work with new peers in my class.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2.	I would like to work with peer supports in another class.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.	I had enough help from a teacher or teaching assistant (i.e., paraprofessional) to work with my peers well.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.	This was too much work for me.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.	I feel my peers helped me effectively.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.	It was easier to get my own work done while working with my peers.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7.	The initial orientation meeting with a teacher/paraprofessional was helpful. [leave blank if you did not participate]	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8.	Other students in the class should also do this.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9.	I would like to work with peer supports in this class in the future.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10.	I understand why the teachers thought peer supports would be helpful for me.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11.	Our school should have more peer supports for students with disabilities.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12.	I benefited *socially* from having a peer support (e.g., talk more with my peers, have more friends).	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13.	I benefited *academically* from having a peer support (e.g., participate more in class, learned new skills).	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
14.	I spend time with my peer partners outside of this class.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15.	I enjoy coming to this class.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16.	I consider my peer partner to be a friend.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
17.	I would recommend having peer supports to my other friends with disabilities.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
18.	I like coming to school.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19.	My peer partners introduced me to other new friends.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
20.	Overall, I enjoyed being in this project.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Social Validity Survey for Peer Partners

Peer Support Feedback Survey

Student: _____ School: _____ Semester: _____

Thank you for being a peer support! We want to know your thoughts about the project. Please read each of the following statements and **circle** the answer that best reflects your views. This information will help us improve the project experience for future students.

1.	At first, I was excited to become a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2.	I felt confident serving in this role.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.	I had enough help from a teacher or teaching assistant (i.e., paraprofessional) to do this role well.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.	This was too much work for me.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.	I feel I was effective in this role.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.	It was easy to get my own work done while part of this project.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7.	The initial orientation meeting with a teacher/paraprofessional was helpful.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8.	Other students in the class should also do this.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9.	I would be a peer support again in the future.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10.	I understand why the teachers thought peer supports would be helpful for my partner with a disability.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11.	Our school should have more peer supports for students with disabilities.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12.	My partner benefited *socially* from having a peer support (e.g., talks more with peers, has more friends).	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13.	My partner with disabilities benefited *academically* from having a peer support (e.g., participates more in class, learns new skills).	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
14.	I benefitted *socially* from being a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15.	I benefitted *academically* from being a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16.	I consider my partner with disabilities to be a friend.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
17.	I would recommend being a peer support to my other friends.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
18.	My views about students with disabilities have changed for the better.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19.	I also spend time with other students who have similar disabilities at my school.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
20.	Overall, I enjoyed being in this project.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Social Validity Survey for Facilitators

Peer Support Adult Facilitator Feedback Survey

Staff: _____ School: _____ Semester: _____

Thank you for your contributions to this project! We want to know your thoughts about being a peer support facilitator. Please read each of the following statements and **circle** the answer that best reflects your views. This information will help us improve the project experience for the future.

1.	The amount of time required to use this strategy was reasonable.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2.	The amount of time required for record keeping with this strategy was reasonable.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.	I feel I was effective in this role.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.	I would need ongoing consultation to keep implementing this strategy.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.	Implementation of this strategy required considerable support from other school staff.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.	The student with a disability benefitted *academically* from having a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7.	I am motivated to continue using this strategy.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8.	I would not be interested in implementing this strategy again.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9.	The social skills assessment results were useful to further understand the needs of the student.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10.	This strategy fits well within this classroom.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11.	I understood the procedures of this strategy.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12.	I would know what to do if I was asked to implement this strategy again.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13.	The student with a disability benefitted *socially* from having a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
14.	Participation in the assessment required a considerable amount of time.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15.	The student with a disability has more friends as a result of this project.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16.	The peers without disabilities benefitted *socially* from being a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
17.	The peers without disabilities benefitted *academically* from being a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
18.	The assessment process would be helpful for other students that I work with.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19.	This strategy was a good way to address the educational needs of the student with a disability.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
20.	This strategy negatively impacted other students in the class.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21.	I could use the strategies I learned through this project with other students.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
22.	Overall, I enjoyed participating in this project.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Social Validity Survey for General Educators

General Educator Feedback Survey

Teacher: _____ School: _____ Semester: _____

Thank you for your contributions to this project! We want to know your thoughts about having a peer support arrangement in your classroom. Please read each of the following statements and **circle** the answer that best reflects your views. This information will help us improve the project experience for the future.

1.	The amount of time required for me to use this strategy (i.e., peer supports) in my classroom was reasonable.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2.	I often use cooperative learning strategies with students in my classroom.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.	The peer support strategy would be feasible for me to implement if additional school staff were not in my classroom.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4.	I would need ongoing consultation to keep implementing this strategy.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5.	Implementation of this strategy required considerable support from other school staff.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6.	This strategy was a good way to address the educational needs of students without disabilities.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7.	The assessment required a considerable amount of time.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8.	I would know what to do if I was asked to implement this strategy in the future.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9.	I am motivated to continue using this strategy.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10.	I would not be interested in implementing this strategy again.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11.	This strategy was a good way to address the educational needs of the student with a disability.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12.	This strategy fits well within this classroom.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13.	I understood the procedures of this strategy.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
14.	The social skills assessment results were useful to further understand the needs of the student.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15.	The peers without disabilities benefitted *academically* from being a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16.	The student with a disability benefitted *academically* from having a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
17.	The student with a disability benefitted *socially* from having a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
18.	The peers without disabilities benefitted *socially* from being a peer support.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19.	The student with a disability has more friends as a result of this project.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
20.	The assessment process would be helpful for other students that I work with.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21.	The assessment process was disruptive to ongoing classroom activities	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
22.	I could use the strategies from this project with other students.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
23.	This strategy negatively impacted other students in the class.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
24.	Overall, I enjoyed having this project in my classroom.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

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