Efficacy of Peer Support Interventions in General Education Classrooms for High School Students With Autism Spectrum Disorder

Erik W. Carter, PhD[1], Jenny R. Gustafson, MEd[1],
Melissa A. Sreckovic, PhD[2], Jessica R. Dykstra Steinbrenner, PhD[2],
Nigel P. Pierce, PhD[3], Aimee Bord, MA[4], Aaron Stabel, MA[4],
Sally Rogers, PhD[4], Alicia Czerw, MEd[1], and Teagan Mullins, MEd[1]

Abstract

Even with inclusive general education classrooms, high school students with autism spectrum disorder (ASD) often have few social interactions with classmates. Peer support arrangements hold promise for increasing peer interactions and shared learning within general education classrooms. However, previous evaluations of this intervention have focused narrowly on adolescents with severe intellectual disability. In this pilot study, we examined the impact and social validity of peer support arrangements for four high school students with ASD. All four students increased their social interactions with peers, while academic engagement either increased or maintained for three students. Social validity data from peer partners and students indicated they considered the intervention acceptable. We discuss limitations and offer recommendations for future research and practice aimed at enhancing social connections within inclusive classrooms.

Keywords

peer-mediated, adolescents, inclusion, general education access

Supporting students with disabilities to access social and learning opportunities available within the general education curriculum has been a longstanding focus of federal legislation, policy initiatives, and research efforts. For students with autism spectrum disorder (ASD), these efforts have resulted in increasing numbers of students spending at least some portion of their day in general education classrooms alongside their peers without disabilities. From 2000–2001 to 2011–2012, students with autism who spent more than 40% of their school day in general education classrooms increased from 39.6% to 57.6% (U.S. Department of Education, 2014). These trends have been accompanied by burgeoning interest in evidence-based approaches for supporting meaningful participation in inclusive classrooms (e.g., Hughes, Kaplan, et al., 2013; Wong et al., 2014).

Supporting the inclusion of students with ASD within secondary school classrooms, however, is not without substantive challenges. Observational studies suggest adolescents with ASD still have few peer interactions in general education classrooms, spend limited time in close proximity to classmates, and infrequently participate in collaborative work with peers (Kurth & Mastergeorge, 2012). For example, Carter, Sisco, Brown, Brickham, and Al-Khabbaz

(2008) documented low and inconsistent rates of peer interaction among students with ASD or intellectual disability enrolled in inclusive middle and high school classrooms. Indeed, no peer interactions took place during the entire class period in one quarter of all observations. Likewise, Feldman, Carter, Asmus, and Brock (2016) found that high school students with ASD were in close proximity (i.e., within 3 feet) of peers without disabilities in general education classrooms for an average of only 38.1% of the entire class period. The social-related challenges associated with the ASD diagnosis could contribute in part to this paucity of peer interaction (American Psychiatric Association, 2013). However, opportunity barriers may also have an influential

[1]Vanderbilt University, Nashville, TN, USA
[2]The University of North Carolina at Chapel Hill, USA
[3]North Carolina Central University, Durham, USA
[4]University of California, Davis, USA

Corresponding Author:
Erik W. Carter, Vanderbilt University, Department of Special Education, PMB 228, Peabody College, Nashville, TN 37203, USA.
Email: erik.carter@vanderbilt.edu

role in the high school classroom. Lecture-based instructional formats may provide few opportunities for collaborative work, peers may be reluctant to initiate conversations with their classmates with ASD due to attitudinal barriers, and active facilitation of peer interactions is rarely undertaken by school staff (Carter et al., 2014). The primary focus of the present study was on expanding the social interaction opportunities students with ASD encounter within inclusive high school classrooms.

Peer-mediated interventions are widely advocated as evidence-based approaches for enhancing the social interactions of students with ASD in schools (see reviews by Bene, Banda, & Brown, 2014; Watkins et al., 2015; Wong et al., 2014). A defining feature of these interventions is the active involvement of peers in providing assistance to promote the social-related skill acquisition and/or active participation of students with disabilities. Several variations of peer-mediated approaches have been examined in secondary schools. For example, peer networks establish cohesive social groups and shared activities beyond the classroom (e.g., Gardner et al., 2014; Haring & Breen, 1992; Hochman, Carter, Bottema-Beutel, Harvey, & Gustafson, 2015; Koegel, Kim, Koegel, & Schwartzman, 2013), cooperative learning groups arrange for students with and without disabilities to work together toward common learning goals (e.g., Cushing, Kennedy, Shukla, Davis, & Meyer, 1997), social competence interventions can involve peers in reinforcing the social skill acquisition of students with ASD (Schmidt & Stichter, 2012), communication book interventions have involved training peers to teach students with ASD to initiate (Hughes, Bernstein, et al., 2013), and self-monitoring strategies can be used to teach general education peers to initiate conversations with classmates with autism (e.g., Hughes, Harvey, et al., 2013). While most research on peer-mediated interventions involving students with ASD has been carried out in preschool and elementary school contexts or outside of the general education classroom, one particular approach—peer support arrangements—has accrued growing evidence of efficacy and social validity within inclusive middle and high school classrooms. Peer support arrangements involve one or more students without developmental disabilities providing social and/or academic support to a classmate with a disability in a general education classroom (Carter & Kennedy, 2006). Peers are invited from within the same classroom to participate in an initial training session regarding their roles, provide individualized supports outlined in a written plan throughout the semester, and receive needed guidance from staff present within the classroom (e.g., paraprofessionals, special educators, general educators). Although these components comprise the key elements of peer support arrangements, each can be individually tailored to meet the unique needs of a given student and the instructional context (e.g., the number of peer partners, the academic and social supports exchanged by students, the amount of facilitation school staff provide). Such arrangements address prevailing skill *and* opportunity barriers by creating interdependent learning contexts in which students with ASD gain more access to appropriate peer models, interaction opportunities, and additional assistance.

Peer support arrangements have been evaluated among students with severe intellectual disability at the high school level in three single-case studies and one randomized control trial (e.g., Carter et al., 2016; Carter, Cushing, Clark, & Kennedy, 2005; Carter, Moss, Hoffman, Chung, & Sisco, 2011; Carter, Sisco, Melekoglu, & Kurkowski, 2007). All four studies documented substantial increases in social interactions with classmates relative to when students with severe disabilities worked alone or with adult support (e.g., paraprofessionals, special educators). Moreover, students with disabilities either maintained or increased their academic engagement when interventions were established. School staff reported these approaches are feasible to implement and fit well within the classroom. Students and their peer partners also viewed these interventions favorably, felt they benefited from involvement, and affirmed their interest in continuing the intervention.

Additional research is needed to extend these findings in two key areas. First, prior evaluations of peer support arrangements have focused entirely on students with severe disabilities (i.e., students who also have an intellectual disability and are eligible for the state's alternate assessment), and only two of these studies included students who also had autism (i.e., Carter et al., 2016; Carter et al., 2005). Understanding the implementation and impact of these interventions among students with ASD whose support needs are less extensive is an enduring need. For such students, the academic assistance often associated with these interventions may assume less importance than the social-related supports peer partners can provide. Indeed, a primary goal of these interventions is to increase peer interactions *without* negatively impacting active engagement in class activities. Research involving high school students with ASD who do not have an intellectual disability has instead focused on out-of-classroom interactions (Gardner et al., 2014; Koegel et al., 2013) or classroom-based interventions that have not focused on promoting class engagement (Hughes, Bernstein, et al., 2013). Second, prior evaluations of peer support arrangements have involved the presence of a paraprofessional or special educator in the classroom to provide periodic facilitation as students with and without disabilities worked together. Yet, many students with ASD are not supported by an additional staff within general education classrooms.

The purpose of the present study was to evaluate the efficacy of peer support arrangements on the social interactions and academic participation of high school students with

Table I. Student Demographics and Classroom Information.

Students with ASD		Peer partners		Setting		
Name, age, gender, race, diagnosis	Testing	Gender; race	Nominator and reason for nomination	Classroom; no of students	Community context; school schedule	School enrollment (approximate); % FRPM; % ELL
James, 18, M, B, Autism	SCQ = 27 BRIEF = 78 VABS-II Communication = 69 Daily Living = 82 Socialization = 84 Composite = 76	1 F, 2 M; 1 H, 2 W	Business teacher sought students with appropriate social skills and who she anticipated would get along well with the focus student	Business; 26	Urban; alternating block schedule (100 min)	1,200 students; 89% FRPM; 20% ELL
Thomas, 17, M, W, Asperger syndrome, Attention-deficit disorder	SCQ = 19 BRIEF = 78 VABS-II Communication = 92 Daily Living = 78 Socialization = 76 Composite = 80	1 F; 1 W	Math teacher sought peers with strong social skills, good attendance, willingness to be a support[a]	Math; 20	Rural; block schedule (90 min, 1 day per week; blocks were 70 min)	1,300 students; 23% FRPM; 4% ELL
Phillip, 16, M, W, Autism	SCQ = 26 BRIEF = 72 VABS-II Communication = 96 Daily Living = 92 Socialization = 72 Composite = 85	2 F, 1 M; 2 B, 1 W	Science teacher sought peers with appropriate social skills and interest in working with the focus student	Science; 20	Suburban; block schedule (4 blocks, 90 min)	1,200 students; 35% FRPM; 2% ELL
Terry, 19, M, W, Autism	SCQ = 27 BRIEF = 78 VABS-II Communication = 64 Daily Living = 76 Socialization = 72 Composite = 68	6 M; 5 W, 1 B	PE teacher sought peers interested in participating	Physical education; 35	Suburban; block schedule (4 blocks, 90 min)	1,200 students; 35% FRPM; 2% ELL

Note. ASD = autism spectrum disorder; FRPM = eligible for free or reduced-price meals; ELL = students with limited English proficiency; M = male; B = Black; SCQ = *Social Communication Questionnaire*; BRIEF = *Behavior Rating Inventory of Executive Function*; VABS-II = *Vineland Adaptive Behavior Scale–II*; F = female; H = Hispanic; W = White; PE = physical education.
[a]Thomas's peer partner missed several weeks of school due to a family crisis.

ASD. We recruited students without co-occurring intellectual disability and implemented the interventions in classrooms in which additional special education staff were not present to provide ongoing facilitation. In addition, we explored the feasibility and acceptability of peer support arrangements from the perspective of peer partners. This pilot study took place as part of a larger iterative development project aimed at refining peer support interventions for students across the entire autism spectrum. Because our experience with students without severe disabilities was limited and no prior evaluations of peer support interventions involved students with autism who did not have severe cognitive impairments, we sought to first demonstrate whether peer support arrangements could work well with these students before designing future studies in which researcher involvement in intervention design or delivery was wholly removed.

Method

Participants

Students with ASD. To be included in this study, students had to (a) be served under the special education category of autism, (b) not be eligible for their state's alternate assessment, (c) have social-related goals in their individualized education program (IEP) or exhibit difficulties with age-appropriate social skills, (d) be nominated by their special education case manager as someone who would benefit from having peer supports, (e) be enrolled in at least one general education high school class without one-to-one paraprofessional support, and (f) provide assent and parental consent. We asked four students with ASD to participate in the study; all assented and all parents provided consent. See Table 1 for participant information.

James was an African American male in the 12th grade. Because of an alternating block schedule, James took eight classes per semester, including four "life skills" classes. His IEP contained several adaptive behavior goals focused on making eye contact and taking turns in conversations. Thomas was a Caucasian male in the 11th grade. His school was on a block schedule, and he took four classes per semester, all in general education settings. He had IEP goals related to engaging in appropriate conversation topics with peers and adults. Phillip was a Caucasian male in the 10th grade. All of his courses were in general education classrooms. His IEP goals all addressed functional academics. However, the school team indicated he struggled with social skills in school. Terry was a Caucasian male who received special education services primarily in special education classes. He was included in a physical education class two times per week to address the physical and social goals described in his IEP. Terry had an IEP goal of initiating conversation with teachers and peers.

Peer partners. We worked with general educators to recruit one or more classmates to serve as peer partners who met the following inclusion criteria: (a) enrolled within the same general education classroom, (b) had prior interactions with the focus student, (c) were recommended by the teacher as a student who would likely be effective in this role, and/or (d) expressed an interest. Although the active involvement of peers is a core component of peer support arrangements, the number of participating peers can be flexible based on the needs of the student and the classroom context. We asked classroom teachers to suggest names of peers they thought would be effective. Likewise, we also asked each focus student to suggest names of peers with whom they would like to work. However, none of the students had specific suggestions. We asked 13 peers to serve as peer partners; all agreed to participate, and all parents provided consent. All peer partners were in Grades 9 to 12 (exact ages of peers were not available). See Table 1 for more information about the peer partners, as well as why they were recruited.

Participating adults. Project staff worked with general educators to establish peer support arrangements in each classroom (i.e., invite peers, provide initial peer training) for all focus students and to assist in facilitating them (e.g., give periodic feedback and guidance to peers) for two of the four students. Specifically, two female project coaches working toward a master's degree in special education helped the teacher launch James's peer support arrangement, and a female project coach with background knowledge in social language deficits helped with the intervention for Thomas and his peers. The general education teachers in Phillip's and Terry's classrooms both facilitated the groups for these two students with limited project coach help.

School and Classroom Settings

This study was conducted across three states as part of a multisite intervention development project. After receiving university and district approvals to implement aspects of a comprehensive intervention for high school students with ASD (Odom, Duda, Kucharczyk, Cox, & Stabel, 2014), we met with school representatives to explain peer support arrangements, identify students who might benefit from involvement, and obtain consent and/or assent. See Table 1 for the setting information for each participant.

Experimental Design and Procedures

We used an adaptation of a nonconcurrent multiple-baseline-across-participants design to evaluate the impact of peer support arrangements implemented in three schools across three states during the same spring semester. We adopted this design variation because (a) grant resources precluded us from implementing all four tiers at a single site; (b) we needed to implement the interventions early in the semester to allow sufficient time to refine, package, and train on the intervention in advance of a subsequent multisite randomized trial; and (c) introducing the intervention in different states at different points in the school semester calendar allowed us to address history and maturation effects. Because each district adopted distinct school calendars, the intervention began 34 days into the spring semester for James, 28 days for Thomas, 39 days for Phillip, and 82 days for Terry. As recommended in the literature (Christ, 2007; Harvey, May, & Kennedy, 2004), we deliberately planned variations in lengths of the baseline conditions, began with a priori hypotheses about anticipated changes, and visually arrayed our data temporally to indicate when observations occurred relative to other tiers. To mitigate one key limitation of this design (Gast & Ledford, 2014), we planned some overlap of baseline and intervention phases for the first three tiers to allow concurrent evaluation of dependent measure levels. Because of delays in participant recruitment, the baseline phase for the final tier occurred much later in the semester and was not concurrent with the other baseline phases. Given our primary focus on increasing peer interactions, we based phase-change decisions on social interaction outcome data. If data were not stable after a pre-specified number of baseline data points, we planned to extend data collection until a predictable pattern emerged.

Baseline procedures. Prior to implementing the intervention, we conducted a minimum of five baseline observations to document the prevailing social and academic participation of students with ASD in each classroom. Observations were conducted under "business as usual" conditions. Although students may have naturally received occasional help from classmates, no new peer-mediated interventions were

introduced to these students, and we observed no formal pairings of students throughout the study.

Peer support arrangements. Peer support arrangements involve equipping one or more peers to provide ongoing social and/or academic support to their classmate with a disability (Carter & Kennedy, 2006). Peers were recruited from within the same classroom, participated in an initial training session with other peer partners (45–60 min), and provided individualized supports throughout the semester as outlined in a written plan. The intervention procedures mirrored those of prior studies involving adolescents with severe disabilities with two main exceptions. First, the training of peers did not cover content related to supporting students with complex communication challenges (i.e., interacting with someone who uses augmentative and alternative communication), addressing behavioral concerns, or using assistive technology. Second, general educators worked in tandem with members of the project team to facilitate two of these interventions (i.e., Phillip and Terry), as individually assigned paraprofessionals and special educators were not present in the classrooms. Prior studies have involved the additional step of equipping paraprofessionals to orient peers to their roles, to facilitate ongoing interactions, and to fade their close proximity over time.

After appropriate permissions were obtained, participating peer partners attended a formal orientation/training session led by project staff. The training addressed the following items: (a) the rationale for peer support strategies; (b) background about the focus student; (c) general goals of increasing the number of students with whom the focus student interacted, increasing involvement in classroom activities, and decreasing reliance on adult support; (d) the importance of confidentiality and respectful language; (e) expectations specific to the classroom and support strategies from the peer support plan; and (f) guidance about when to seek assistance. We followed a written outline and used verbal description and discussion to address each topic.

We created a written peer support plan that was shared during the orientation meeting and reviewed with the peer partners (see Carter et al., 2015). The plan outlined social and academic support strategies that could be used throughout the class period (i.e., beginning, middle, end) and in a variety of conditions (e.g., free time, lecture, small group, labs). Examples of social supports could include conversing with the focus student about upcoming school and other activities when there is no instruction, modeling appropriate social skills, making introductions to other classmates, encouraging the focus student to talk with classmates, reinforcing social attempts, and giving advice. Examples of academic supports might include encouraging the focus student to make a contribution to whole-class or small-group discussion, sharing class materials or notes, working jointly on class assignments, clarifying a key concept, redirecting the student when he or she is off-task, and helping the student stay organized. As recommended in the literature, each plan was individualized to match the needs of the student within each classroom. We explained each section of the written plan, offered examples of what support might look like, and encouraged peers to ask questions and suggest other ways to increase the focus student's social interactions. The peer support plan was also shared with the general educator. The focus student was not involved in developing the written plan.

In all but one of the peer partner orientations, the student with ASD was not present. However, Phillip had not disclosed his autism diagnosis and did not want to be singled out as different from his peers. Therefore, the orientation meeting included all students (i.e., peer partners and focus student). The purpose of the intervention was described more broadly as helping each other do well in science class and to talk with and hang out with peers. Each student was asked to think about their own challenges in class and to share them with the group in the form of a goal (e.g., I want to participate more in class). The group brainstormed ways they could support each other on reaching these goals. A peer support plan was created for everyone. All students listed what they could do, what their peers could do, and what the facilitator could do to help each other. Thus, discussion focused on how each student could support all other students in the group, rather than focusing only on support for the target student. Phillip was not singled out as the only person who needed support, and his partners were not provided confidential information about Phillip. All other aspects of the training were the same.

Facilitators for James, Thomas, and Terry held separate meetings with these students to discuss together the purposes of their peer support arrangements. James agreed the purpose of the group was to help him focus in class, make eye contact with peers, and get to know more classmates. Terry's facilitator and Terry agreed on a group purpose of helping him be successful in gym class and hang out with other people in his class. Thomas was also very involved in discussions about the purpose of his group (i.e., to help him make friends and improve his social skills).

After the orientation meeting, peer partners were asked to sit in close proximity to the focus student during class. During the first few class periods, the facilitator (i.e., project staff for James and Thomas, general education teacher for Phillip and Terry) provided support and encouraged students to interact with one another. As students appeared more comfortable working together, adult support was gradually faded. By the end of the intervention, the facilitator only provided support at the end of class in the form of brief "check-ins" with each student. These "check-ins" occurred through verbal conversations or written student rating surveys. After each class period, the facilitator (or coach) and observer

Table 2. Treatment Fidelity Findings Based on Facilitator Checklists.

Abbreviated indicators	James	Thomas	Phillip	Terry
Facilitator recruited at least one peer for the intervention[a]	100%	100%	100%	100%
Facilitator addressed all topics at the initial peer orientation meeting[a]	100%	100%	100%	100%
Facilitator supported peer partners and students[a]	100%	100%	100%	100%
She or he facilitated interactions during class when appropriate[b]	100%	17%	100%	100%
Facilitator provided reminders/feedback to peer partners before, during, or after class[b]	80%	50%	100%	80%
Facilitator provided praise and feedback to students with ASD during or outside of class[b]	80%	50%	67%	100%
Peer supports were in close proximity to focus student during class[a]	100%	100%	100%	100%
Students sat next to each other[b]	100%	100%	100%	80%
Students remained in close proximity during out-of-seat activities[b]	67%	n/a	n/a	100%
During group activities, students joined the same group[b]	33%	n/a	100%	100%
Peer partners interacted with student in class[a]	100%	100%	100%	100%
Peer partners greeted the student (e.g., "Hi" or "See you later")[b]	100%	100%	0%	80%
Peer partners included the student in interactions with other classmates[b]	60%	83%	25%	75%
Peer partners assisted the student academically[a]	100%	67%	100%	100%
Peer partners helped the student participate in class activities[b]	67%	67%	83%	100%
Peer partners repeated or rephrased instructions for student[b]	80%	83%	33%	25%
Peer partners appropriately prompted the student[b]	100%	100%	67%	80%
Peer partners provided appropriate feedback to the student[b]	100%	100%	100%	100%
Students worked together on classroom activities[b]	33%	17%	100%	100%
Students shared work materials[b]	100%	0%	50%	75%

Note. Values represent the percentage of intervention phase observations during which the answer was recorded as *yes*; "n/a" indicates no opportunity (no out-of-seat or group activities) during observation period. ASD = autism spectrum disorder.
[a]Core intervention components identified for peer support arrangements. [b]Denotes a sub-component of the core component under which it is listed.

independently completed an intervention fidelity form. Table 2 displays fidelity data for the facilitators. We considered the intervention to be implemented sufficiently during a given class when the six core intervention components (bold in Table 2) were observed. Components that are not bold may not have been implemented or necessary, depending on the instructional context or needs of a given student.

Measures

Observational measures. To measure social and academic participation, observers conducted 20 min in vivo observations in each classroom. Observers memorized definitions of all measures, scored 100% on the quiz, and coded two videos depicting peer support interventions with a minimum of 80% agreement on each video against a master protocol. Live observations took place throughout the first 20 min of a class period, beginning when the student entered the classroom. We used a combination of partial-interval recording (15 s observe, 15 s record) and momentary time sampling (30 s), both across 40 intervals. Although intervals were cued using a handheld device, we recorded data on a written observational sheet. No audio or video recordings were made.

Social interactions and initiations. We coded social interactions and initiations using partial-interval recording. Social interactions were defined as verbal or nonverbal

(e.g., gestures, signs) communicative behaviors directed toward a classmate (or from a classmate to the focus student). Initiations were those communicative behaviors that reflected a change in topic and/or were preceded by 5 s without any social interaction. While we coded each social interaction exchanged among students with ASD and any other classmate, we only coded the initiations of students with ASD. We anticipated substantial increases in communicative behaviors by focus students and peers, but only modest increases in initiations.

Academic engagement. We used momentary time sampling to document whether the student with ASD was engaged consistently, engaged inconsistently, or unengaged at the end of each 30 s interval. If the focus student was engaged in instructional activities and/or tasks assigned by the teacher aligned with the content provided to the majority of the class, he was considered engaged consistent. If the focus student was attending to instructional activities and/or tasks assigned by the teacher *not* aligned to the content provided to the majority of the class (e.g., drawing a picture or coloring when the rest of the class was calculating math equations), the student was coded as engaged inconsistent. If the focus student was not doing anything or involved in activities not assigned by the teacher, he was considered unengaged. We anticipated academic engagement would maintain or increase when focus students worked alongside peers.

Proximity to others. Using momentary time sampling, we recorded whether another person was in physical proximity to the focus student at the end of each 30 s interval. We defined proximity as being oriented in a position and distance allowing interactions (about 3 feet or less). Observers recorded the focus student's proximity to peer partners, other classmates without ASD, other students with disabilities, and general educators. We viewed increases in proximity to peer partners as providing an additional indicator of intervention fidelity.

Instructional format. Using momentary time sampling, we recorded whether students were participating in large-group instruction (7 or more students), small-group instruction (2–6 students), individual work (no other students), or no instruction (i.e., periods of "free time," when a teacher was doing administrative work or talking with students about matters unrelated to the class). "Gone" indicated the student was not present in the classroom.

Interaction quality ratings. On a narrative sheet, observers provided subjective ratings of three dimensions of interactions with peers using 5-point, Likert-type scales at the end of each observation: reciprocity (1 = *low*, 2 = *medium-low*, 3 = *medium*, 4 = *medium-high*, 5 = *high*), affect (1 = *negative*, 2 = *mildly negative*, 3 = *neutral*, 4 = *mildly positive*, 5 = *positive*), and overall interaction quality (1 = *low*, 2 = *medium-low*, 3 = *medium*, 4 = *medium-high*, 5 = *high*). High reciprocity was defined as both students initiating and responding equally; medium reciprocity was defined as either student initiating and responding considerably more than their conversational partner (but their partner did contribute); and low reciprocity was defined as either student receiving little or no responses to their initiations. Positive affect was defined as both students smiling and displaying attentive body language throughout most of the interaction; neutral interactions were characterized by those in which students primarily displayed neither positive nor negative affect; and negative affect was defined as student showing anger, displeasure, or verbal/physical aggression during the interaction. Overall interaction quality of the focus student referenced to typical interactions among students in the same setting. Interactions were rated as high in quality when they were almost identical to or very similar to those of other peers in the setting; low quality interactions differed significantly from those of other peers in the setting. Ratings were provided only when interactions among students and peers were observed and were considered a supplement to more objective coding of interactions.

Interobserver agreement. A second observer simultaneously but independently coded an average of 38% of the sessions for the four students (range: 27%–45%). We calculated overall interval agreement by dividing the total number

of intervals in which observers agreed by the total number of intervals and multiplying by 100%. We then averaged agreement results across observation sessions for each participant and report mean and range across participants as follows: social interactions from focus student to peer partner (99%; 95%–100%), peer partner to focus student (99%; 93%–100%), focus student to any peer (99%; 95%–100%), and any peer to focus student (99%; 95%–100%); academic engagement (93%; 73%–100%); proximity to peer partners (100%; 98%–100%), to other peers (99%; 90%–100%), to other students with ASD (100%), and to general educators (100%; 95%–100%); instructional format of large-group instruction (100%), small-group instruction (100%; 98%–100%), individual work (100%), no instruction (100%; 98%–100%), and gone (100%); only one observer provided subjective interaction ratings.

Social validity. At the end of the semester, peer partners completed social validity surveys containing both Likert-type and open-ended questions. The survey contained 20 items on a 5-point, Likert-type scale (see Table 4). Four open-ended questions were included about what went well, what could have been better, what (if anything) changed for the peer as a result of being a peer support, and what (if anything) changed for the partner as a result of having a peer support. All peers completed a social validity form except Thomas's peer partner and two of Terry's peer partners, who were absent on the days we attempted to collect the form. The students with disabilities were provided a similar survey containing 17 items with three response options: *yes, not sure, no* (available from the authors). Questions also addressed whether they liked school, had friends at school, did new things by being part of the group, and liked spending time with their peer partners. The survey included the same four open-ended questions. Terry and Thomas completed the survey; James opted not to. Phillip, whose training focused on all of the peers helping one another, completed the same social validity form as his peer partners. Finally, the two general educators who were involved in co-facilitating peer support arrangements for Terry and Phillip completed social validity surveys adapted from the *Usage Rating Profile* (Chaflouleas, Briesch, & Riley-Tillman, 2009) containing 22 Likert-type and four open-ended questions.

Results

Social Interactions, Initiations, and Interaction Quality Ratings

Social interaction and initiation patterns within and across study conditions are arrayed in Figure 1. For all four students, the mean percentage of intervals containing social interactions with peers increased during the intervention conditions; improvements in initiations were more limited
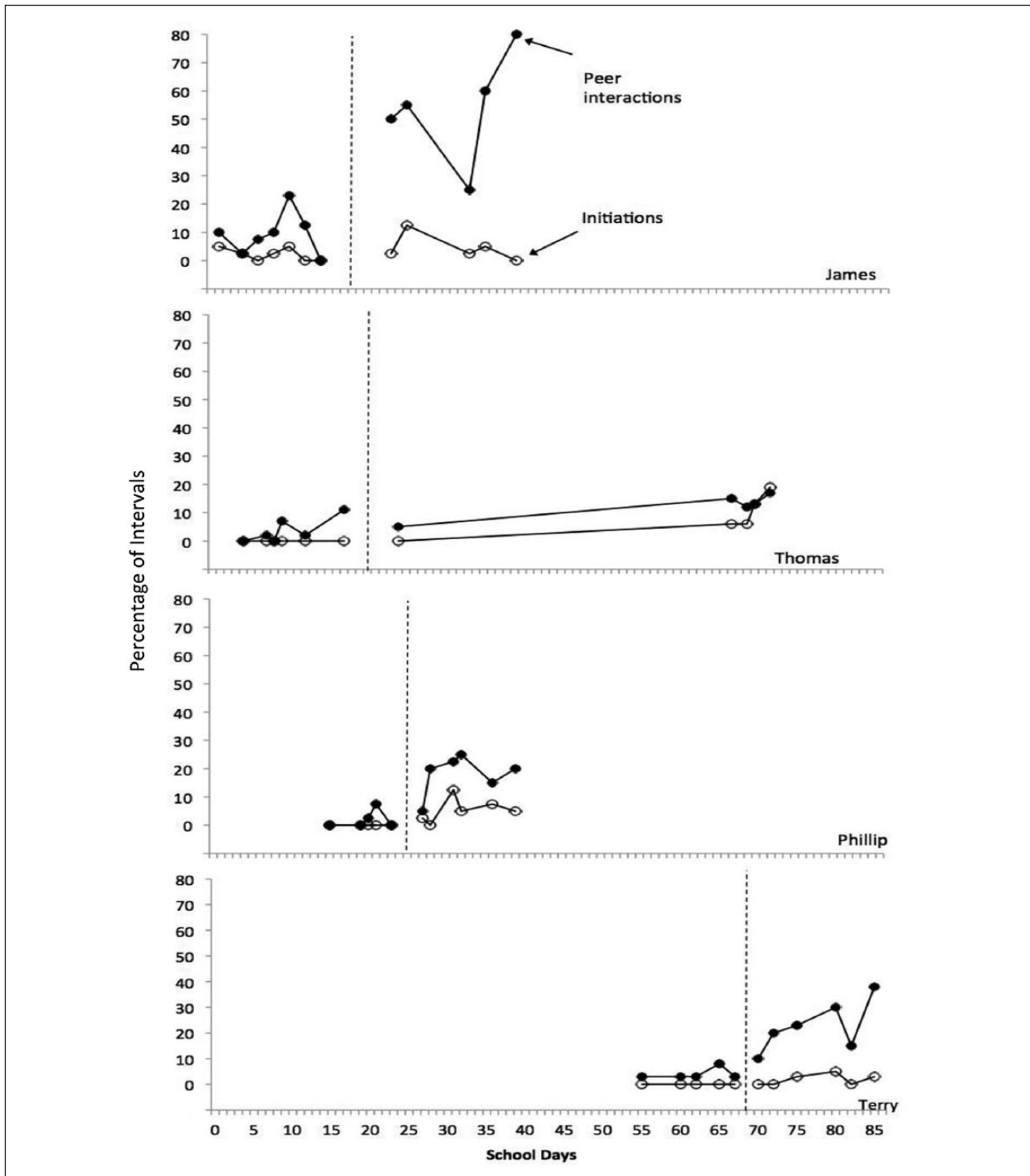
Figure 1. Peer interactions (closed circles) and initiations (open circles) of students with ASD during baseline and intervention conditions.
Note. Data are arrayed across school days during the spring semester. ASD = autism spectrum disorder.

(see Table 3). Interactions with peer partners took place during 100% of intervention sessions. Consistent with prior

peer support evaluations (Carter et al., 2016; Carter et al., 2011), social interactions primarily took place with peer

Table 3. Summary of Observational Data Across Study Phases.

Measure	James		Thomas		Phillip		Terry	
	Baseline	Intervention	Baseline	Intervention	Baseline	Intervention	Baseline	Intervention
Social interactions (%)								
Any peer interactions	9 (0–23)	54 (25–80)	2 (0–7)	12 (5–17)	2 (0–8)	18 (5–25)	4 (3–8)	23 (10–38)
Student to peer partner	0 (0–0)	16 (9–22)	0 (0–0)	5 (1–7)	0 (0–0)	5 (1–6)	0 (0–0)	3 (0–7)
Student to other classmates	3 (0–8)	4 (0–11)	2 (0–7)	1 (0–3)	0 (0–1)	0 (0–0)	1 (0–2)	1 (0–3)
Peer partner to student	0 (0–0)	20 (10–29)	0 (0–0)	5 (3–6)	0 (0–0)	6 (1–9)	0 (0–0)	7 (1–15)
Other classmates to student	3 (0–8)	4 (0–11)	0 (0–0)	1 (0–3)	1 (0–3)	0 (0–1)	1 (1–3)	2 (1–3)
Initiations	2 (0–5)	5 (0–13)	0 (0–0)	7 (0–19)	0 (0–0)	5 (0–13)	0 (0–0)	2 (0–5)
Interaction quality ratings								
Reciprocity[a]	1 (1–2)	3 (3–4)	1 (1)	3 (3–4)	1 (0–2)	3 (2–4)	2 (1–3)	3 (2–3)
Affect[b]	3 (2–3)	2 (1–4)	3 (3)	3 (3)	1 (0–3)	4 (3–4)	3 (2–4)	4 (3–4)
Overall quality[c]	1 (0–1)	3 (2–4)	2 (1–3)	5 (3–5)	1 (0–2)	3 (2–4)	2 (1–4)	3 (3)
Academic engagement (%)								
Engaged consistent	40 (13–78)	24 (3–60)	68 (58–90)	82 (65–100)	63 (25–85)	76 (45–90)	83 (73–95)	81 (68–98)
Engaged inconsistent	0 (0–0)	0 (0–0)	3 (0–13)	5 (0–15)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
Unengaged	61 (23–88)	77 (40–98)	27 (10–43)	0 (0–0)	15 (6–30)	10 (4–22)	7 (2–11)	8 (1–13)
Proximity (%)								
To peer partners	0 (0–0)	54 (20–98)	0 (0–0)	97 (93–100)	0 (0–0)	100 (100)	0 (0–0)	88 (68–100)
To other classmates	39 (10–63)	22 (0–58)	97 (85–100)	100 (100)	99 (93–100)	13 (0–75)	99 (95–100)	93 (80–100)
To other students w/ ASD	6 (0–45)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
To general education staff	8 (0–28)	5 (0–20)	92 (73–100)	78 (0–100)	3 (0–13)	5 (0–10)	0 (0–0)	0 (0–0)
Instructional format (%)								
Large-group instruction	62 (28–88)	30 (0–60)	50 (5–65)	68 (55–100)	64 (23–100)	89 (63–100)	81 (73–95)	81 (68–98)
Small-group instruction	16 (0–58)	0 (0–0)	0 (0–0)	4 (0–25)	11 (0–53)	11 (0–38)	2 (0–8)	3 (0–20)
Individual work	4 (0–20)	14 (0–68)	7 (0–23)	8 (0–13)	25 (0–77)	0 (0–0)	0 (0–0)	0 (0–0)
No instruction	18 (8–35)	57 (33–93)	29 (13–43)	21 (0–35)	1 (0–5)	0 (0–0)	22 (5–45)	16 (0–33)

Note. The figures represent *M* (range). ASD = autism spectrum disorder.
[a]1 = *low*, 2 = *medium-low*, 3 = *medium*, 4 = *medium-high*, 5 = *high*. [b]1 = *negative*, 2 = *mildly negative*, 3 = *neutral*, 4 = *mildly positive*, 5 = *positive*. [c]1 = *low*, 2 = *medium-low*, 3 = *medium*, 4 = *medium-high*, 5 = *high*.

partners rather than with other classmates who had not received training. Specifically, 83.2% of interactions from the focus student were to peer partners, and 84.2% of all interactions to the focus student came from peer partners.

James interacted infrequently with peers during the baseline condition (*M* = 9% of intervals; range: 0%–23%). Upon participating in a peer supports arrangement, increases in social interaction were immediate and occurred during an average of 54% of intervals (range: 25%–80%). The percentage of non-overlapping data (PND) was 100%, reflecting clear differentiation across conditions. Although interactions were variable across both conditions, the trend increased considerably during the intervention condition. Overall, James's contributions to interactions were only slightly lower than those of peers, suggesting interaction patterns were fairly balanced. Observers rated the interactions as medium in reciprocity (*M* = 3, range: 3–4) and overall quality (*M* = 3, range: 2–4). Initiations increased from 2% to 5% across study conditions.

Thomas also interacted with peers rarely during the baseline condition (*M* = 2% of intervals; range: 0%–7%), despite

being in close proximity to classmates throughout nearly all of the observations. Although increases in the overall level of social interaction were apparent across the intervention condition (*M* = 12% of intervals; range: 5%–17%) and overlap was limited (PND = 83%), differences across conditions were modest, and the baseline trend was already slightly positive. Moreover, the extended absence of his peer partner resulted in most data being collected more than 12 weeks after initial training, although the facilitator provided a refresher training upon the peer's return to school. Observers rated the interactions as medium in reciprocity (*M* = 3, range: 1–3) and high in overall quality (*M* = 5, range: 3–5). Initiations increased from 0% to 11% across study conditions.

Although in proximity to classmates throughout most of the observations, Phillip interacted with peers during just two of the five baseline observations (*M* = 2% of intervals; range: 0%–8%). After introducing the peer supports arrangement, social interactions increased to an average of 18% of intervals (range: 5%–25%). PND was also high (83%), reflecting limited overlap across conditions. Data trends in both conditions were fairly flat, differentiated primarily by their level.

Observers rated the interactions as medium in reciprocity (M = 3, range: 2–4) and overall quality (M = 3, range: 2–4). Initiations increased from 0% to 5% across study conditions.

Terry was observed interacting with classmates only once or twice during each of the five baseline observations (M = 4% of intervals; range: 3%–8%). His overall percentage of peer interactions increased to an average of 23% of intervals (range: 10%–38%) upon introduction of the peer support arrangement. Clear differentiation was evident across conditions (PND = 100%). However, interactions were less balanced. Observers rated interactions as medium in reciprocity (M = 3, range: 2–3) and overall quality (M = 3) during the intervention condition. Initiations increased from 0% to 2% across study conditions.

Academic Engagement

Across all four participants, the percentage of intervals with consistent academic engagement was highly variable across both baseline and intervention conditions with considerable overlap (see Figure 2). Overall levels indicated the average number of intervals during which the student was academically engaged increased for two students (Thomas and Phillip), maintained for one student (Terry), and decreased for one student (James; see Table 3 for means and ranges). For James, however, substantially higher levels of "no instruction" were observed in the intervention condition relative to the baseline condition (i.e., 57% vs. 18%), severely limiting the opportunities he had to be engaged in learning activities.

Social Validity

Social validity findings for peers are shown in Table 4. Peers felt they were effective in their roles, wanted to be part of future interventions, enjoyed their participation, and would like to see it implemented more often and for longer amounts of time. They affirmed their partner benefited socially from being a part of a peer group. Several peers stated their grades improved or cited improvements in "my patience with other people." They enjoyed "working together and asking each other for help," as well as "becoming friends with new people I have never met."

Both Terry and Thomas were excited to be part of a peer group, felt comfortable participating, felt as if they contributed to the group, claimed other students in the school should be part of a peer group, considered their peer partners to be friends, and enjoyed being part of the group. They both said being part of the peer group was not hard for them and that they would do it again in the future. Thomas stated, "I believe I'm feeling a little more social." However, Terry said he would not like to continue hanging out with his peer partners moving forward. Although Phillip provided a "neutral" response for most questions, he agreed his class should have more peer groups for students.

Both Terry and Phillip's general education teachers agreed or strongly agreed they had the skills to implement the intervention, the amount of time required to implement and keep records was reasonable, it would not be disruptive to other students, they liked the procedures, the intervention was a good way to support the needs of students with ASD, it promoted academic and/or social engagement, it helped to promote the students' IEP goals, and they were motivated to continue using this intervention. One teacher said, "The student displayed more willingness to interact with other students," and "He interacts more during all parts of the class."

Discussion

Despite calls to better support students with ASD in inclusive classrooms, a paucity of research has explored effective avenues for carrying out this charge. All four adolescents in this study took general education classes, yet rarely interacted with any other classmates. We examined peer support arrangements as an avenue for enhancing their social participation. This pilot study builds upon a large body of peer-mediated research at the elementary level or involving students with severe disabilities by providing new insights into the implementation and impact of these interventions for high school students with ASD with less extensive support needs.

First, we documented distinct social advantages of involving high school students with ASD in peer support arrangements. Increases in peer interactions were evident for all four students, accompanied by much smaller improvements in initiations. These findings are important as baseline data indicate the students interacted rarely with any classmates, despite being enrolled in the same classroom. Several aspects of these interventions could contribute to these observed gains, including the initial training and direction provided to peers, the increased proximity students had to peers, peer modeling of social and communication skills, or simply the introduction of shared activities. Although our design does not allow us to disentangle the distinct contributions of these (or other) components, peer support arrangements appear to address prevailing opportunity barriers by creating teacher-sanctioned, interdependent interaction opportunities within an instructional setting. Consistent with prior studies (e.g., Carter et al., 2016; Carter et al., 2011), we also note that most of the interactions during the intervention occurred with classmates who served as peer partners. Additional research is needed to identify potential refinements to the recruitment, training, and/or support processes that might promote more generalized involvement with other classmates not directly part of the peer support group. Limited generalization of effects is a recurring lament within the social interaction literature.

Second, a negative impact on academic participation was not evident as students with ASD began working more
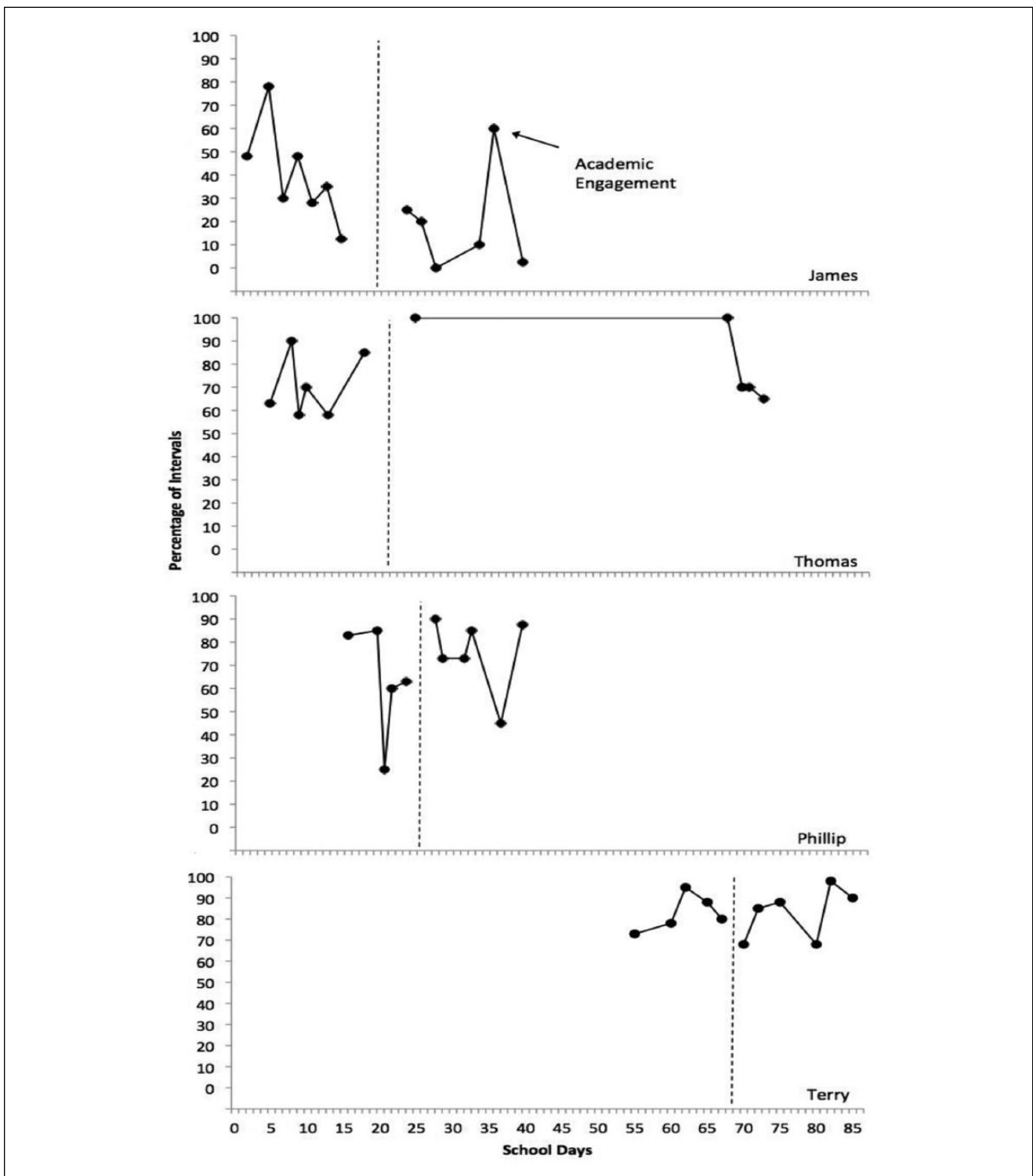
Figure 2. Academic engagement of students with ASD during baseline and intervention conditions.
Note. Data are arrayed across school days during the spring semester. ASD = autism spectrum disorder.

closely with their peers without disabilities. Consistent with prior studies involving students with severe disabilities (Carter et al., 2016; Carter et al., 2011; Carter et al., 2007), overall academic engagement increased or maintained for three students. For the fourth student, observed decreases in academic engagement appeared to be driven primarily by

Table 4. Peer Ratings of the Social Validity of Peer Support Interventions.

Social validity survey questions	James	Thomas	Phillip	Terry
At first, I was excited to become a peer support.	3/4	—	4/4/4	4/3/3/4
I felt confident serving in this role.	5/4	—	4/5/4	4/3/4/4
I had enough help from a teacher or other representative to do this role well.	4/4	—	5/5/5	4/4/3/4
This was too much work for me.	1/2	—	2/1/2	2/3/3/2
I feel like I was effective in this role.	5/3	—	4/5/4	4/2/3/4
It was easy to get my own work done while part of this project.	5/4	—	4/5/4	4/4/3/5
The initial orientation meeting with a representative and teacher/paraprofessional was helpful.	4/3	—	4/4/4	4/4/4/5
Other students in the class should also do this.	5/3	—	4/4/5	4/3/4/4
I would be a peer support again in the future.	4/3	—	4/5/4	4/3/3/4
I understand why teachers thought peer supports would be helpful for my partners.	3/3	—	4/5/4	4/4/4/4
Our school should have more peer supports for students.	4/3	—	4/3/5	4/3/4/4
My partner benefited *socially* from having a peer support.	5/4	—	3/5/4	4/3/4/4
My partner benefited *academically* from having a peer support.	4/3	—	3/4/4	4/3/4/3
I benefited *socially* from being a peer support.	4/3	—	3/3/4	4/2/3/4
I benefited *academically* from being a peer support.	3/3	—	4/3/4	4/2/2/3
I consider my partners to be friends.	5/3	—	4/5/3	4/3/4/5
I would recommend being a peer support to my other friends.	4/3	—	*/5/5[a]	4/3/3/4
My views about other students in my group have changed for the better.	4/3	—	3/5/3	4/3/3/4
I spend time with students who need extra support in the classroom at my school.	4/3	—	3/5/4	3/2/3/2
Overall, I enjoyed being in this project.	5/3	—	4/5/5	5/3/3/4

Note. ASD = autism spectrum disorder; 1 = *strongly disagree*; 2 = *disagree*; 3 = *neutral*; 4 = *agree*; 5 = *strongly agree*.
[a]Item was skipped.

changes in instructional patterns within the classroom (i.e., substantially more time in which no instruction was evident during the intervention condition). While the peer support interventions implemented in these classes were all designed with a strong social accent, we had still hoped academic engagement would either endure or increase for all students. A stronger emphasis on the design and delivery of academic-related supports may be needed to further enhance learning outcomes. Incorporating strategies used within peer tutoring interventions (e.g., Bene et al., 2014) or cooperative learning groups (e.g., Cushing et al., 1997) may hold promise for improving the impact on learning.

Third, while this study suggests peer support arrangements can still have a beneficial impact when additional special education staff are not present within an inclusive classroom, the approach documented in this study has some important drawbacks to consider. Outcomes in this study generally were more muted than those documented in prior single-case studies evaluating this intervention among students with severe disabilities. In classes comprised of 20 to 35 students, general educators may have relatively limited time to devote to monitoring and supporting individualized interventions for students with ASD. Moreover, the involvement of paraprofessionals and special educators could enhance the quality of written peer support plans, increase the degree to which peer interaction and shared work is actively prompted, and ensure benefits continue to accrue to students throughout the semester through active monitoring

and feedback. While we are not advocating for the addition of individually assigned adults to inclusive classrooms (see concerns outlined by Giangreco, 2010), periodic support and input from special educators may make these interventions more feasible to implement and enhance their impact. This may be especially important for general educators who receive limited training about students with ASD and their instructional needs (Kucharczyk et al., 2015).

Fourth, feedback from participating peers affirms the acceptability and social validity of these interventions within inclusive high school classrooms. Peer partners generally found it easy to get their own work done, felt confident in their roles, would recommend this role to other peers, and considered their partner to have become a friend. Related research suggests such sustained contact may shape the attitudes toward and expectations of students about people with disabilities (Siperstein, Parker, Bardon, & Widaman, 2007). Yet, few studies have asked high school students to share their perspectives on supporting their classmates with ASD in inclusive settings (e.g., Hughes, Kaplan, et al., 2013). Our findings suggest peers may be quite willing to get involved in the lives and learning of their schoolmates with ASD. However, the views of students with ASD were more tempered. Terry and Thomas affirmed most aspects of the intervention, while Phillip indicated neutral views. Although input into the choice of peers was sought at the outset of the intervention and feedback obtained afterward, it may be instructive to solicit

feedback at more periodic intervals throughout the semester to inform potential refinements.

Limitations and Future Research

Additional research is needed to address several limitations of this pilot study. First, we limited our observations to the first 20 min of class. Although observational sampling (e.g., 10–15 min samples) is widely used in the peer-mediated literature, it may be that different interaction patterns (and opportunities) unfold later in the class period. For example, we were somewhat surprised by the limited amount of instruction occurring during the first 20 min of these high school classes. Peer interactions tended to occur more often during small-group and paired learning activities relative to lecture-based lessons and independent seat work, suggesting instructional format may be an important mitigating factor to explore in future studies. Second, while we collected enough data to document clear changes in interaction patterns and sufficiently high levels of fidelity, we missed the opportunity to capture the longer-term impact of these interventions across the entire semester. By limiting the scope of our data collection, we cannot speak to whether intervention effects would weaken, strengthen, or maintain as students accrue experience working together. Future research is needed to see how implementation changes over time, when outcomes are optimal, and what factors lead to increases or decreases over time.

Third, while our adapted design protected against some key threats to internal validity (see Christ, 2007; Harvey et al., 2004), the limited overlap across all four tiers tempers the causal claims that can be made from this study. We attempted to attenuate this limitation by launching the interventions at different points in each school's semester, including some data overlap in the first three tiers, fluctuating baseline lengths, and staggering the intervention at different times in the semester. Although the study took place across schools and states, the pacing of the study remains an important limitation. We hope the promising findings reflected in this pilot study might spur new research incorporating more rigorous single-case designs or randomized control trials to replicate this work and enable stronger causal claims. Fourth, we did not examine the extent to which the interactions taking place within peer support arrangements spilled over to other times of the school day (e.g., other classes, the cafeteria, breaks) or endured over time (e.g., beyond the semester in which the intervention was delivered). The scarcity of strong generalization findings has been highlighted repeatedly in the literature (e.g., Hughes, Bernstein, et al., 2013; Watkins et al., 2015). Future studies should focus on the ways in which the selection of peer partners, the training peers are provided, and the ways in which peers support students might lead to a more lasting and widespread impact.

Fifth, while not a limitation per se, highly individualized interventions—like the one examined in this study—warrant much close consideration in the literature. Peer support arrangements are intended to be flexible interventions that can and should be tailored to meet the individualized needs of a particular student within a given classroom context. For example, the peers who are selected, the substance of the written support plan, and the ways in which students work together can vary considerably from one student, class, or semester to the next. This raises important questions about just what it means to implement an intervention with a high degree of fidelity when that intervention is applied somewhat differently across students. In an era when intervention fidelity is garnering much attention, we recommend future scholars explore the complex relationship between individualization and implementation fidelity.

Implications for Practice

Inclusive education must be accompanied by the practice of delivering individualized supports to students with ASD. As reflected in this study, the social and academic advantages often attributed to inclusive classrooms are unlikely to materialize apart from intentional intervention efforts tailored to a student's individualized needs. This pilot study suggests peer-mediated interventions hold promise for strengthening the social participation of students with ASD in general education classrooms. However, careful consideration should be given to the design and delivery of these interventions for students with ASD who do not have an intellectual disability. First, the manner in which peers are invited and equipped to provide support to their classmates must be aligned with the focus student's preferences. For example, students with ASD may not have disclosed their disabilities and would consider formalized support from peers to be intrusive (e.g., Bottema-Beutel, Mullins, Harvey, Gustafson, & Carter, 2016). Others—like Phillip—may not want information shared about them without being present. The choice of peers may also matter. For example, Terry said he enjoyed being part of the peer support arrangement, but suggested he might prefer different peers.

Second, the types of support important for peers to accentuate may vary based on the needs of the focus student and the nature of the class. While we did not collect observational data on moment-by-moment support behavior, we anecdotally noticed differences across settings. James's peers socialized with him during transition and free time and helped him with class projects on the computer. They supported his ideas in large-group projects by providing positive encouragement. For Thomas, peer partners prompted hand raising to replace blurting out behaviors during lectures, invited him to join small-group activities, extended conversations when appropriate during non-lecture based instruction, and engaged in positive social

exchanges before and after class, as well as during activity transitions. Phillip and his peers socialized during transition times and worked together on warm-up activities. During the remainder of class, the students reminded each other to stay engaged and on task, encouraged each other to participate, and modeled positive behavior for each other. Terry and his peers socialized with each other during transitions and whole- or small-group activities. Terry's peer partners modeled the stretches, activities, and exercises and verbally encouraged him as he was participating.

Third, although students with ASD are thought of primarily in terms of their social-related needs, efforts to support learning and class engagement may warrant comparable attention (Fleury et al., 2014). None of the students in this study demonstrated exceptionally high rates of academic engagement prior to or after the intervention. This finding—also reflected in studies focused on high school students with severe intellectual disability—highlights the importance of also considering additional adaptations, accommodations, and instructional supports—from either peers or educators—that might also promote deeper engagement in curricular activities. Truly comprehensive support models should consider the ways in which both rigor and relationships are being fostered in inclusive classrooms.

Acknowledgments

Declaration of Conflicting Interests

Funding

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Bene, K., Banda, D. R., & Brown, D. (2014). A meta-analysis of peer-mediated instructional arrangements and autism. *Review Journal of Autism and Developmental Disorders*, *1*, 135–142. doi:10.1007/s40489-014-0014-9

Bottema-Beutel, K., Mullins, T., Harvey, M., Gustafson, J. R., & Carter, E. W. (2016). Avoiding the "brick wall of awkward": Perspectives of youth with autism spectrum disorder on social-focused intervention practices. *Autism*, *20*, 196–206. doi:10.1177/1362361315574888

Carter, E. W., Asmus, J., Moss, C. K., Amirault, K. A., Biggs, E. E., Bolt, D., . . . Wier, K. (2016). Randomized evaluation of peer supports arrangements to support the inclusion of high school students with severe disabilities. *Exceptional Children*, *82*, 209–233. doi:10.1177/0014402915598780

Carter, E. W. K., Common, E. A., Sreckovic, M. A., Huber, H. B., Bottema-Beutel, K., Gustafson, J. R., . . . Hume, K. (2014). Promoting social competence and peer relationships for adolescents with autism spectrum disorders. *Remedial and Special Education*, *35*, 27–37. doi:10.1177/0741932513514618

Carter, E. W. K., Cushing, L. S., Clark, N. M., & Kennedy, C. H. (2005). Effects of peer support interventions on students' access to the general curriculum and social interactions. *Research and Practice for Persons with Severe Disabilities*, *30*, 15–25. doi:10.2511/rpsd.30.1.15

Carter, E. W. K., & Kennedy, C. H. (2006). Promoting access to the general curriculum using peer support strategies. *Research and Practice for Persons with Severe Disabilities*, *31*, 284–292. doi: 10.1177/154079690603100402

Carter, E. W. K., Moss, C. K., Asmus, J., Fesperman, E., Cooney, M., Brock, M. E., . . . Vincent, L. B. (2015). Promoting inclusion, social connections, and learning through peer support arrangements. *TEACHING Exceptional Children*, *48*, 9–18. doi:10.1177/0040059915594784

Carter, E. W. K., Moss, C. K., Hoffman, A., Chung, Y., & Sisco, L. G. (2011). Efficacy and social validity of peer support arrangements for adolescents with disabilities. *Exceptional Children*, *78*, 107–125. doi:10.1177/001440291107800107

Carter, E. W. K., Sisco, L. G., Brown, L., Brickham, D., & Al-Khabbaz, Z. A. (2008). Peer interactions and academic engagement of youth with developmental disabilities in inclusive middle and high school classrooms. *American Journal on Mental Retardation*, *113*, 479–494. doi:10.1352/2008.113:479-494

Carter, E. W., Sisco, L. G., Melekoglu, M. A., & Kurkowski, C. (2007). Peer supports as an alternative to individually assigned paraprofessionals in inclusive high school classrooms. *Research and Practice for Persons with Severe Disabilities*, *32*, 213–227. doi:10.2511/rpsd.32.4.213

Chaflouleas, S. M., Briesch, A. M., & Riley-Tillman, C. (2009). *Usage rating profile—Intervention*. Mansfield: University of Connecticut.

Christ, T. J. (2007). Experimental control and threats to internal validity of concurrent and nonconcurrent multiple baseline designs. *Psychology in the Schools*, *44*, 451–459. doi:10.1002/pits.20237

Cushing, L. S., Kennedy, C. H., Shukla, S., Davis, J., & Meyer, K. A. (1997). Disentangling the effects of curriculum revision and social grouping within cooperative learning arrangements. *Focus on Autism and Other Developmental Disabilities*, *12*, 231–240. doi:10.1177/108835769701200405

Feldman, R., Carter, E. W., Asmus, J., & Brock, M. E. (2016). Presence, proximity, and peer interactions of adolescents with severe disabilities in general education classrooms. *Exceptional Children*, *82*, 170–191. doi:10.1177/0014402915585481

Fleury, V. P., Hedges, S., Hume, K., Browder, D. M., Thompson, J. L., Fallin, K., & Vaughn, S. (2014). Addressing the academic needs of adolescents with autism spectrum disorder in

secondary education. *Remedial and Special Education*, *35*, 68–79. doi:10.1177/0741932513518823

Gardner, K., Carter, E. W., Gustafson, J. R., Hochman, J. M., Harvey, M. N., Mullins, T. S., & Fan, H. (2014). Effects of peer networks on the social interactions of high school students with autism spectrum disorders. *Research and Practice for Persons with Severe Disabilities*, *39*, 100–118. doi:10.1177/1540796914544550

Gast, D. L., & Ledford, J. R. (2014). *Single case research methodology: Applications in special education and behavioral sciences* (2nd ed.). New York, NY: Routledge.

Giangreco, M. F. (2010). One-to-one paraprofessionals for students with disabilities in inclusive classrooms: Is conventional wisdom wrong? *Intellectual & Developmental Disabilities*, *48*, 1–13. doi:10.1352/1934-9556-48.1.1

Haring, T. G., & Breen, C. G. (1992). A peer-mediated social network intervention to enhance the social integration of persons with moderate and severe disabilities. *Journal of Applied Behavioral Analysis*, *25*, 319–333. doi:10.1901/jaba.1992.25-319

Harvey, M., May, M., & Kennedy, C. (2004). Nonconcurrent multiple baseline designs and the evaluation of educational systems. *Journal of Behavioral Education*, *13*, 267–276. doi:10.1023/B:JOBE.0000044735.51022.5d

Hochman, J. M., Carter, E. W., Bottema-Beutel, K., Harvey, M. N., & Gustafson, J. R. (2015). Efficacy of peer networks to increase social connections among high school students with and without autism. *Exceptional Children*, *82*, 96–116. doi:10.1177/0014402915585482

Hughes, C., Bernstein, R. T., Kaplan, L. M., Reilly, C. M., Brigham, N. L., Cosgriff, J., . . . Boykin, M. (2013). Increasing conversational interactions between verbal high school students with autism and their peers without disabilities. *Focus on Autism and Other Developmental Disabilities*, *28*, 241–254. doi:10.1177/1088357613487019

Hughes, C., Harvey, M., Cosgriff, J., Reilly, C., Heilingoetter, J., Brigham, N., . . . Bernstein, R. (2013). A peer-delivered social interaction intervention for high school students with autism. *Research and Practice for Persons with Severe Disabilities*, *38*, 1–16. doi:10.2511/027494813807046999

Hughes, C. R., Kaplan, L., Bernstein, R., Boykin, M., Reilly, C., Brigham, N., . . . Harvey, M. (2013). Increasing social interaction skills of secondary school students with autism and/ or intellectual disability: A review of interventions. *Research and Practice for Persons With Severe Disabilities*, *37*, 288–307. doi:10.2511/027494813805327214

Koegel, R., Kim, S., Koegel, L., & Schwartzman, B. (2013). Improving socialization for high school students with ASD by using their preferred interests. *Journal of Autism and Developmental Disorders*, *43*, 2121–2134. doi:10.1007/s10803-013-1765-3

Kucharczyk, S., Reutebuch, C. K., Carter, E. W., Hedges, S., Farah, E., Fan, H., & Gustafson, J. R. (2015). Addressing the needs of adolescents with autism spectrum disorders: Considerations and complexities for high school interventions. *Exceptional Children*, *81*, 329–349. doi:10.1177/0014402914563703

Kurth, J., & Mastergeorge, A. M. (2012). Impact of setting and instructional context for adolescents with autism. *The Journal of Special Education*, *46*, 36–48. doi:10.1177/0022466910366480

Odom, S. L., Duda, M. A., Kucharczyk, S., Cox, A. W., & Stabel, A. (2014). Applying an implementation science framework for adoption of a comprehensive program for high school students with autism spectrum disorder. *Remedial and Special Education*, *35*, 123–132. doi:10.1177/0741932513519826

Schmidt, C., & Stichter, J. P. (2012). The use of peer-mediated interventions to promote the generalization of social competence for adolescents with high-functioning autism and Asperger's syndrome. *Exceptionality*, *20*, 94–113. doi:10.1080/09362835.2012.669303

Siperstein, G. N., Parker, R. C., Bardon, J. N., & Widaman, K. F. (2007). A national study of youth attitudes toward the inclusion of students with intellectual disabilities. *Exceptional Children*, *73*, 435–455.

U.S. Department of Education. (2014). *IDEA data*. Washington, DC: Author.

Watkins, L., O'Reilly, M., Kuhn, M., Gevarter, C., Lancioni, G. E., Sigafoos, J., & Lang, R. (2015). A review of peer-mediated social interaction interventions for students with autism in inclusive settings. *Journal of Autism and Developmental Disorders*, *45*, 1070–1083. doi:10.1007/s10803-014-2264-x

Wong, C., Odom, S. L., Hume, K., Cox, A. W., Fettig, A., Kucharczyk, S., . . . Schultz, T. R. (2014). *Evidence-based practices for children, youth, and young adults with autism spectrum disorder*. Chapel Hill: The University of North Carolina.