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Randomized Evaluation of Peer Support Arrangements to Support the Inclusion of High School Students With Severe Disabilities

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Abstract

Enhancing the social and learning experiences of students with severe disabilities in inclusive classrooms has been a long-standing focus of research, legislative, and advocacy efforts. The authors used a randomized controlled experimental design to examine the efficacy of peer support arrangements to improve academic and social outcomes for 51 students with severe disabilities in high school general education classrooms. Paraprofessionals or special educators recruited, trained, and supported 106 peers to provide individualized academic and social assistance to students with severe disabilities throughout one semester. Compared to students exclusively receiving adult-delivered support (n = 48), students participating in peer support arrangements experienced increased interactions with peers, increased academic engagement, more progress on individualized social goals, increased social participation, and a greater number of new friendships. Moreover, an appreciable proportion of relationships lasted one and two semesters later after the intervention had concluded. These findings challenge prevailing practices for supporting inclusive education and establish the efficacy and social validity of peer support arrangements as a promising alternative to individually assigned paraprofessional support.

Over the past decade, growing attention has centered on identifying how best to support students with severe disabilities to access rigorous, relevant learning opportunities within the general education classroom (e.g., McLeskey, Waldron, Spooner, & Algozzine, 2014; Ryndak, Jackson, & White, 2013). Myriad legislative, policy, and research developments have changed expectations not only for *what* students with severe disabilities can and should learn, but also *where* they should receive this instruction. Although not disaggregated by disability severity, national data indicate 43% of students with intellectual disability, 57% of students with autism, and 28% of students with multiple disabilities now spend at least 40% of their day in general education

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classes in secondary schools (U.S. Department of Education, 2012). An underlying presumption is that enrollment in general education classrooms expands the social opportunities of students, creates shared learning experiences alongside peers, and increases access to educators with content expertise. Moreover, the opportunities peers have to learn alongside and develop relationships with their classmates with severe disabilities are presumed to shape their attitudes toward and expectations of people with disabilities (Carter, Hughes, Copeland, & Breen, 2001; Scior, 2011).

At the same time, considerable concern has been raised regarding the prevailing approaches used to support students with severe disabilities in general education classrooms. The U.S. Department of Education (2012) has reported that more than 411,000 full-time equivalent special education paraprofessionals work with students ages 6 to 21. Regional studies suggest most of these staff work one-to-one with students at least weekly and almost half provide some support in general education classrooms (Carter, O'Rourke, Sisco, & Pelsue, 2009; Fisher & Pleasants, 2012). When assigned as the primary or exclusive source of assistance for students with severe disabilities in general education classrooms, paraprofessionals may inadvertently hinder the very social and academic gains they are present to promote (Giangreco, 2010). This concern may be especially heightened at the high school level as curricular content becomes more challenging and the close proximity of adults often suppresses adolescent interactions. Descriptive data from both observational studies and the baseline phases of intervention studies often paint a portrait of students with disabilities who are present in general education classrooms without having a presence and enrolled without being meaningfully engaged (e.g., Carter, Hughes, Guth, & Copeland, 2005; Carter, Sisco, Brown, Brickham, & Al-Khabbaz, 2008; Feldman, Carter, Asmus, & Brock, 2015; Hughes et al., 2013).

The present study explores the efficacy and acceptability of peer support arrangements as an alternative to an exclusive reliance on assistance from special education staff in high school general education classrooms. Peer support arrangements involve equipping one or more peers to provide ongoing academic and/or social support to their classmate with a severe disability throughout the semester as they work together on activities designed for all students by the classroom teacher (Carter, Cushing, & Kennedy, 2009). Peers are recruited from within the same classroom, participate in an initial orientation, provide individualized supports outlined in a written plan, and receive ongoing guidance and feedback from paraprofessionals and educators as they assist their classmate. Socially, peers model age-appropriate social and communication skills, increase opportunities to contribute to task- and social-related discussions in the classroom, and diminish proximity and attitudinal barriers within the classroom (Bandura, 1977; Carter, Sisco, & Chung, 2012). Academically, working alongside peers may increase the amount of individualized supports, corrective feedback, and response opportunities students with severe disabilities receive as they learn course content, as well as the extent to which the materials and instruction they receive aligns with what general educators provide to all students in the class (Carter & Kennedy, 2006). Conceptually, paraprofessionals and peers work in tandem to enable the focus student to learn relevant content from the classroom teacher. In other words, support from these individuals should supplement, rather than supplant, instruction provided by a highly qualified professional (Giangreco, Carter, Doyle, & Suter, 2010).

A small collection of single-case studies has documented the promise of these interventions for supporting the general education participation of adolescents with severe disabilities (Carter, Cushing, Clark, & Kennedy, 2005; Carter, Moss, Hoffman, Chung, & Sisco, 2011; Carter, Sisco, Melekoglu, & Kurkowski, 2007; Shukla, Kennedy, & Cushing, 1998, 1999). Students with disabilities in these studies interacted substantially more often with their classmates when working with peers relative to when supported entirely by paraprofessionals. Moreover, they accessed a wide range of social, learning, and behavioral supports from peers. Although documentation of learning outcomes is limited, these

interventions promoted academic engagement at least as well as, if not better than, individually assigned paraprofessional supports.

Additional research is needed to provide deeper insights into the implementation and impact of these interventions in high school settings. First, the current literature is composed entirely of within-participant evaluations involving a total of just 15 adolescents with severe disabilities. Randomized controlled studies involving larger samples of students served across states could enable stronger claims about the efficacy and generalizability of this intervention approach. Second, an expanded range of outcome measures is needed to elucidate the diverse ways in which students are impacted by these arrangements. Although much attention has focused on broad social interaction behaviors, little is known about how these interventions affect the goal attainment, skill acquisition, and friendship formation of students with disabilities. Moreover, scant attention has been given to capturing how students, peers, and staff view these interventions. Third, most evaluations of peer-mediated interventions have been limited to a single semester. Follow-up data are needed to determine whether any new peer relationships endure across multiple semesters. Fourth, prior studies have involved researchers either in directly implementing key aspects of the intervention or providing intensive support to school staff. Ensuring practitioners can deliver these interventions with adequate fidelity and limited external support is essential to establishing support models as tractable in typical schools.

The purpose of this study was to evaluate the efficacy and social validity of peer support interventions for high school students with severe disabilities. We sought to answer the following research questions: How do peer support arrangements affect the academic and social participation, social skills, goal attainment, and peer connections of high school students with severe disabilities? What do the peer interactions and supports exchanged look like within these interventions? How do participating students, peers, paraprofessionals, and educators view the acceptability and feasibility of these interventions?

Method

Participants

This multiyear, randomized controlled study involved 99 high school students with severe disabilities, 106 peer partners, and 51 school staff.

Students with severe disabilities. To be included, students must have (a) received special education services under the categories of intellectual disability and autism spectrum disorder (ASD), and/or qualified for the state's alternate assessment; (b) been enrolled in at least one general education class (other than physical education); and (c) received individually assigned paraprofessional or special educator support in that class. After receiving university and district research approvals, we worked with school staff to identify all students meeting these criteria, randomly assigned them to one of three study conditions (i.e., peer support arrangements, paraprofessional/adult support only, peer networks), and obtained relevant consent/assent. The present article focuses on the first two conditions to examine the effect and acceptability of an intervention focused on classroom participation (i.e., peer networks take place outside of instructional time).

From the 206 students originally invited to participate in the peer support and comparison conditions, we obtained a final sample of 51 and 48 students, respectively. The total number of students enrolled in the study each semester was 15 in fall 2011, 24 in spring 2012, 25 in fall 2012, 26 in spring 2013, and 9 in fall 2013. Table 1 displays participant characteristics by group. No differences were found between groups on the variables of gender, $\chi^2(1, n = 99) = 1.053$, $p = .305$; race/ethnicity (i.e., White vs. non-White), $\chi^2(1, n = 99) = .043$, $p = .835$; eligibility for free or reduced-price meals, $\chi^2(1, n = 97) = 1.16$, $p = .281$; age, $t(97) = 0.880$, $p = .381$; or adaptive behavior composite scores, $t(97) = 0.72$, $p = .473$. However, the Childhood Autism Rating Scale–2 (Schopler, Van Bourgondien, Wellman, & Love, 2010) scores of students with ASD in the peer support condition indicated more

Table 1. Focus Student and Peer Partner Demographics.

	Students with severe disabilities		
	Comparison (n = 48)	Peer support (n = 51)	Peer partners (n = 106)
Gender[a]			
Female	15 (31.2%)	21 (41.2%)	33 (12.3%)
Male	33 (68.8%)	30 (58.8%)	73 (68.9%)
Grade level[a]			
9th	9 (18.8%)	9 (17.6%)	30 (28.3%)
10th	19 (39.6%)	19 (37.3%)	23 (21.7%)
11th	15 (31.3%)	11 (21.6%)	23 (21.7%)
12th	5 (10.4%)	12 (23.5%)	30 (28.3%)
Race/ethnicity[a]			
European American	32 (66.7%)	34 (66.7%)	81 (76.4%)
African American	8 (16.7%)	7 (13.7 %)	13 (12.3%)
Asian American	3 (6.3%)	4 (7.8%)	4 (3.8%)
Native or Alaskan American	1 (2.1%)	2 (3.9%)	1 (0.9%)
Hispanic or Latino/a	0 (0.0%)	0 (0.0%)	4 (3.8%)
Other or multiple	3 (6.3%)	3 (5.9%)	3 (2.8%)
Eligible for free/reduced-price meals[a]			
Yes	18 (37.5%)	14 (27.5%)	—
No	29 (60.4%)	36 (70.6%)	—
Missing information	1 (2.1%)	1 (2.0%)	—
Primary or secondary disability category[a]			
ASD	17 (35.4%)	15 (29.4%)	—
Intellectual disability	22 (47.9%)	28 (54.9%)	—
ASD and intellectual disability	3 (6.3%)	7 (13.7%)	—
Multiple disabilities	1 (2.1%)	1 (2.0%)	
Other developmental disabilities[b]	4 (8.3%)	1 (2%)	
Participation in state assessments[a]			
Alternate assessment	39 (81.3%)	47 (92.2%)	—
Assessment with accommodations	6 (12.5%)	3 (5.9%)	—
Missing information	3 (6.3%)	2 (2.0%)	—
CARS-2[c]			
t-score	43.1 (7.8)	48.5 (9.2)	—
Percentile ranking	27.5 (19.8)	47.1 (24.2)	—
SSIS[c]			
Social skills standard scores	80.8 (16.9)	83.3 (14.7)	—
Problem behaviors standard scores	118.5 (13.8)	118.7 (13.5)	—
Academic competence standard scores	73.6 (15.9)	76.1 (17.5)	—
Vineland-II[c]			
Communication standard scores	64.5 (11.8)	62.8 (10.2)	—
Daily living standard scores	67.3 (12.0)	64.8 (11.8)	—
Socialization standard scores	70.6 (12.4)	69.1 (12.4)	—
Adaptive behavior composite scores	65.2 (11.0)	63.3 (10.8)	—

Note. ASD = autism spectrum disorder; CARS-2 = Childhood Autism Rating Scale, 2nd ed. (Schopler, Van Bourgondien, Wellman, & Love, 2010); SSIS = Social Skills Intervention System (Gresham & Elliot, 2008); Vineland-II = Vineland Adaptive Behavior Scales-Second Edition (Sparrow, Cicchetti, & Balla, 2005).
[a]Frequency (percentage). [b]Student either had only a primary category other than autism spectrum disorder/intellectual disability (ASD/ID), or student had both a primary and secondary category other than ASD/ID. [c]Mean (standard deviation).

severe symptoms than students in the comparison condition, $t(41) = -2.06$, $p = .046$.

Peer partners. For each student assigned to the peer support condition, one or more peers ($M = 2.1$, range = 1–4) from the same classroom were invited to serve as peer partners. We asked teachers and paraprofessionals to solicit input from the focus student and to consider peers who they anticipated would benefit from such involvement, were interested in getting to know the student, would serve as a positive role model, and who had good attendance. Of the 152 peers initially invited by staff, 46 opted not to participate. Once agreeing to participate, all but one of the peer partners remained in this role throughout the semester. In all, 16 (15.1%) peers reported having had prior experience as a peer partner (see Table 1 for demographics). Average percentage of days peers were in attendance during the semester of their involvement was 95.2% ($SD = 5.4$) and average GPA was 3.2 ($SD = 0.8$). End-of-semester grades in the classes in which they served as peer partners were As (66.0%), Bs (20.8%), Cs (8.5%), Ds (1.9%), and Fs (2.8%).

Adult facilitators. Peer support arrangements were facilitated by 42 paraprofessionals and nine special educators assigned to support the focus student. Most paraprofessionals were female (90.5%) and White (94.1%); they averaged 10.3 years ($SD = 6.7$) of total educational experience and 6.8 years ($SD = 5.6$) at their current school. All of the paraprofessionals worked under the direct supervision of a special educator at their school. Most participating special educators were female (77.8%) and all were White (100%); they averaged 9.2 years ($SD = 5.8$) of total educational experience and 5.0 years ($SD = 5.0$) at their current school. These particular special educators did not supervise the participating paraprofessionals.

Schools and Classrooms

Students attended 21 high schools within 12 districts across two states. Using demographics from the final year each high school participated, student enrollment averaged 1357 ($SD = 449$). Average race/ethnicity of students across schools ranged from 1.3% to 54.9% African American ($M = 13.2\%$), 0% to 0.6% American Indian ($M = 0.2\%$), 0% to 10.5% Asian American ($M = 3.9\%$), 36.5% to 94.4% European American ($M = 72.7\%$), 1.5% to 18.9% Hispanic/Latino/a ($M = 7.4\%$), and 0% to 9.8% multiple races ($M = 3.6\%$). The percentage of students eligible for free or reduced-price meals ranged from 5.6% to 63.1% ($M = 28.7\%$).

Our observations and interventions focused on a single general education classroom for each focus student. According to teachers, students were enrolled in an average of 3.3 ($SD = 1.7$; range = 1–7) general education classes during the semester they entered the study ($M = 3.1$ for peer support condition and $M = 3.5$ for the comparison condition). When students were enrolled in more than one general education course, we selected one classroom based on scheduling considerations (e.g., avoiding classes during the same period of the day to accommodate observations) and input from school staff (e.g., classes in which adult support was available). We observed 40 students (40.4%) in core academic classes (i.e., math, science, language arts, social studies) and 59 students (59.5%) in elective and related arts classes (e.g., music, chorus, band, art, theater, dance, digital arts, computer technology, wellness, culinary arts). No differences were found in type of classroom (i.e., core academic versus elective/related arts) by group, $\chi^2(1, n = 99) = 0.326$, $p = .568$. The average length of these classes was 56.1 min ($SD = 18.7$), and the average enrollment was 24.2 students ($SD = 7.4$). In all, 15 schools used 50-min class periods and 6 schools used an alternating day block schedule of 100-min class periods.

Study Conditions

We used a randomized controlled trial with pre, post, and follow-up measures to evaluate the efficacy of peer support interventions on the social and academic outcomes of students.

Peer support arrangements. This intervention condition involved school staff establishing peer support arrangements (Carter, Cushing, & Kennedy, 2009) for focus students.

Facilitator training. All facilitators participated in an initial training lasting an average of 2.5 hr. This didactic training was presented by members of the research team and included oral instruction, structured presentation slides, handouts, and guided discussion. The content addressed the goals of the intervention, strategies for recruiting peers, creating peer support plans, orienting and supporting peers, fading direct support, and the role of the intervention coach. We covered 100% of topics across all trainings.

Peer support planning. Prior to scheduling a planning meeting for each focus student, an assigned coach (i.e., a member of the research team) observed the focus student in his or her respective general education classroom. Subsequently, facilitators and coaches met to develop an individualized peer support plan, which included support strategies (e.g., modeling ways to interact, highlighting similarities, teaching interaction skills) that could be used throughout the class period (i.e., beginning, middle, end) and in a variety of instructional formats (e.g., whole group, lecture, small group, labs) to help students access learning and other expectations within the classroom. Each written plan listed strategies appropriate for the focus student, peer partners, and facilitator (Carter et al., 2011) and was shared with the general and special education teacher (if not already part of the planning). Planning meetings ranged from 25 to 90 min (M = 44 min) and a support plan was developed for 100% of students.

Peer partner training. The initial training for peer partners was led by the facilitators and averaged 34 min (range = 15–60 min) in length. These trainings were delivered outside of the classroom in small groups to peer partners (11.2% of peer partners completed the orientation individually); focus students were not present. Facilitators followed a written outline to ensure they addressed (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 interacts, 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 (Carter, Cushing, & Kennedy, 2009). Project coaches were present.

Peer support arrangements. Following the initial orientation meeting, students changed seats to be in physical proximity. As the students worked together daily throughout the remainder of the semester (M = 8.4 weeks, SD = 2.4), peer partners supported students academically (e.g., encouraging contributions to class and group discussion, sharing materials, collaborating on class assignments) and socially (e.g., conversing about school and other activities, modeling appropriate social skills, making introductions to other classmates) to participate in ordinary class activities, as outlined on a written support plan and/or prompted by facilitators. In other words, the facilitators supported peer partners and focus students in working together on activities organized by the classroom teacher for all students.

Facilitators modeled support strategies and provided feedback as students initially began working together. As students gained experience with one another, the facilitator was encouraged to fade back direct support as appropriate. Coaches were present in the classroom at least twice (range = 2–5) to monitor implementation and provide suggestions, answer questions, encourage use of facilitative strategies, and problem-solve any concerns. We provided facilitators an intervention checklist containing specific strategies for the focus student, peer partners, and facilitators. The self-monitoring checklist was filled out weekly and returned to the coach.

Treatment fidelity. A summary of each aspect of the peer support intervention—as reported by the intervention coach or the facilitator and averaged across students—is displayed in Table 2. Core intervention components are bolded. Data on four of these

Table 2. Fidelity Items for Peer Support Intervention.

	Data source			
	Intervention coach		Peer support facilitator	
Fidelity indicators (abbreviated)	*M* (%)	*SD* (%)	*M* (%)	*SD* (%)
Researcher-implemented items				
Intervention facilitator completed the full training[a]	**100.0**	**0.0**	—	—
Intervention facilitator received a minimum of 2 coaching sessions[a]	**100.0**	**0.0**	—	—
Facilitator-implemented items				
The facilitator recruited at least one peer for the intervention[a]	**100.0**	**0.0**	—	—
The facilitator addressed all topics at the initial peer orientation meeting[a]	**100.0**	**0.0**	—	—
The facilitator supported peer partners and the student[a]	**89.6**	**24.7**	**97.5**	**8.6**
The facilitator provided reminder/feedback to peer partners before, during, or after class[b]	66.6	32.3	95.3	12.9
The facilitator facilitated interactions during class when appropriate[b]	64.0	33.8	91.7	20.4
The facilitator monitored students during class[b]	87.2	26.1	—	—
The facilitator provided praise and feedback to students during or outside of class[b]	62.4	33.4	94.1	10.6
Peer-implemented items				
Peer partners were in close proximity to the focus student during class[a]	**90.0**	**20.5**	**96.7**	**10.5**
The students sat next to each other[b]	86.4	25.1	89.3	20.5
The students remained in close proximity during out-of-seat class activities[b]	65.5	39.4	83.7	24.7
During group activities, the students joined the same group[b]	63.8	43.1	83.9	27.4
Peer partners interacted with the focus student in class[a]	**90.8**	**20.3**	**95.8**	**16.1**
Peer partners greeted the focus student[b]	80.4	26.4	93.0	18.8
The students engaged in conversation[b]	72.5	34.3	85.0	26.9
Peer partners included the student in interactions with other peers[b]	21.0	29.6	60.8	33.6
Peer partners assisted the focus student academically[a]	**82.5**	**24.9**	**91.6**	**20.9**
Peer partners helped the student participate in class activities[b]	63.6	35.0	84.3	25.9
Peer partners repeated or rephrased instructions for the student[b]	44.4	33.5	69.1	37.6
Peer partners appropriately prompted the student[b]	62.6	35.8	77.5	28.9
Peer partners provided appropriate feedback to the student[b]	50.6	35.0	80.8	28.4
The students worked together on classroom activities[b]	42.0	35.7	76.9	33.2
The students shared work materials[b]	34.7	31.2	65.0	39.3

Note. Percentage standard deviations are calculated from the means of fidelity measures collected for each participant. [a]Core intervention components identified for peer support interventions. [b]Denotes a subcomponent of the core component under which it is listed.

main components were collected as students worked together within peer support arrangements: (a) the facilitator supported peer partners and the student, (b) peer partners were in close proximity to the focus student during class, (c) peer partners interacted with the focus student in class, and (d) peer partners assisted the focus student academically. We considered the intervention to be sufficiently implemented during a given class when the first two components and either of the last two components were observed. Using this definition, fidelity averaged 96.2% (*SD* = 11.4%) and 87.6% (*SD* = 16.5%) across participants based on facilitator and coach reports, respectively.

Individually assigned adult support. This "business as usual" comparison condition involved students receiving individually assigned support from paraprofessionals or special educators during ongoing class activities planned by the general educator. This reflected the prevailing support for students in these classrooms as indicated in their individualized education programs. 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. Data describing this condition are displayed in Tables 3 and 4.

Measures and Procedures

Classroom observations. For each focus student, we observed three full-length class periods toward the beginning of the semester (pre) and three full-length class periods toward the end of the semester (post; i.e., 590 total observations; four students missed one post-observation). Each set of three observations was collected over a 2- to 3-week period and lasted an average of 56.8 min of classroom time per observation. We used tablet computers equipped with MOOSES (Version 4) to collect durational (i.e., academic engagement, instructional format, proximity) and frequency (i.e., social interactions) data second-by-second in real time. We converted frequency counts to rates (per hour) and durational measures to percentages of total class time.

Social interactions and peers contacted. We coded all social exchanges between the focus student and other classmates without disabilities as *social interactions. Interactive behaviors* included any verbal or nonverbal behavior with clear communicative intent produced by the focus student to another student without severe disabilities (or vice versa). We coded each interactive behavior according to its function (i.e., initiation, response), topic (i.e., task- or social-related), as well as source and recipient (i.e., focus student, peer support, classmates without disabilities). Interactive behaviors were *task-related* when they addressed activities, materials, or expectations related to the current class; all other interactive behaviors were considered social-related. We coded behaviors as *initiations* if they were preceded by at least 5 s without an interaction, they reflected a change from task- to social-related topic, or they occurred with a new peer; all other interactions were responses. We used the total interactions for the sum of all initiations and responses between the focus student and peers, whereas *focus student contributions* refers to only those initiations and responses made by the focus student. To capture *peers contacted*, we tallied the number of different peers interacting with the student each class period.

Academic engagement. We coded students with disabilities as *engaged in consistent activities* when they were actively involved in or attending to instruction or classroom activities that were aligned with those provided by the general education teacher to the majority of the class. Students with disabilities were *engaged in inconsistent activities* when actively involved in or attending to instruction or activities that were not aligned with those provided to the majority of the class, but were assigned by a paraprofessional or teacher. Students were *not engaged* when not attending to any activities or materials related to instruction or when there was no instruction.

Table 3. Descriptive Statistics of Classroom Observational Data by Condition.

	Comparison group		Peer support group		
Observational measures	Pre	Post	Pre	Post	Peer comparison
Total interactions[a]	17.2 (43.1)	30.6 (64.2)	12.1 (30.9)	50.5 (58.2)	97.7 (100.3)
Social-related interactions only	7.9 (24.5)	17.6 (50.0)	4.7 (15.7)	20.5 (32.3)	61.1 (82.4)
Task-related interactions only	9.3 (24.1)	13.0 (33.5)	7.3 (19.8)	29.9 (43.6)	36.6 (47.4)
Focus student contributions only[a]	8.4 (20.5)	15.5 (31.8)	5.2 (14.8)	22.3 (28.7)	49.8 (60.0)
Total initiations	3.1 (7.5)	5.6 (11.3)	2.0 (5.8)	6.3 (8.9)	14.8 (14.2)
Total responses	5.3 (15.1)	10.0 (23.0)	3.2 (9.3)	16.1 (21.6)	35.0 (38.3)
Peer contributions only[a]	8.8 (23.0)	15.1 (32.9)	6.9 (18.2)	28.1 (30.4)	47.9 (49.6)
Total initiations	3.3 (7.6)	4.8 (11.6)	3.3 (12.4)	11.5 (11.8)	11.4 (11.5)
Total responses	5.6 (15.0)	10.3 (22.6)	3.5 (10.7)	16.6 (22.8)	36.5 (40.2)
Observer ratings					
Reciprocity[b]	2.3 (0.7)	2.3 (0.7)	2.3 (0.7)	2.4 (0.7)	2.9 (0.3)
Appropriateness[b]	2.8 (0.9)	2.9 (0.4)	2.9 (0.4)	2.8 (0.5)	3.0 (0.0)
Affect[b]	2.6 (0.6)	2.5 (0.5)	2.5 (0.6)	2.7 (0.5)	2.9 (0.3)
Response relevance[b]	2.9 (0.2)	2.9 (0.2)	3.0 (0.2)	2.9 (0.3)	3.0 (0.2)
Overall quality[c]	3.6 (1.1)	3.7 (1.1)	3.6 (0.9)	3.8 (0.9)	4.8 (0.5)
Peers contacted[d]	1.18 (1.63)	1.61 (2.09)	1.16 (1.58)	2.51 (1.93)	4.5 (3.2)
Academic engagement[e]	62.2 (31.3)	58.3 (34.6)	64.2 (30.3)	71.1 (26.8)	82.9 (21.7)
Proximity to direct support[e]	48.7 (34.7)	42.3 (35.8)	50.6 (35.2)	31.1 (32.6)	—
Proximity to peer partners[e]	—	—	—	62.9 (29.4)	—
Gone[e]	14.8 (20.4)	18.2 (23.9)	15.9 (18.9)	11.2 (16.3)	0.7 (3.2)

[a]Mean per hour (*SD*). [b]Mean ratings on 3-point Likert-type scale (*SD*). [c]Mean ratings on 5-point Likert-type scale (*SD*). [d]Mean (*SD*). [e]Percentage of class (*SD*).

Proximity to others. We coded whether the focus student was in proximity to peer partner(s), other classmate(s), and the adult assigned to provide direct support. We defined *proximity* as being oriented in a position and distance that allowed interactions (about 3 feet).

Gone. When the focus student was not present in the classroom at any point between the start and end bells, we coded the student as *gone*. This information was collected as one of seven mutually exclusive and exhaustive instructional formats (see Table 5).

Observer ratings. At the end of each observation, we rated different dimensions of the focus student's interactions with peers: reciprocity of interactions (i.e., *low, medium, high*), the appropriateness of content (i.e., *inappropriate, neutral, appropriate*), *affect* of the focus student (i.e., *positive, neutral, negative*), and response relevance (i.e., *not related, somewhat related, mostly related*). We also used a 5-point Likert-type scale to rate the overall quality of the interaction between the peers and focus student (i.e., *low, medium–low, medium, medium–high, high*). Ratings were not made if no interactions occurred during an observation.

Support behavior checklist. We used an observational checklist (see Table 4) to document the occurrence of support behaviors provided by any peers and paraprofessionals toward the focus student at any time during each observed class period. We categorized these as *academic-related supports, social-*

Table 4. Percentage of Class Periods in Which Academic, Social, and/or Other Support Behaviors Were Observed by Source and Group.

	Comparison group				Peer support group			
	Adult-delivered		Peer-delivered		Adult-delivered		Peer-delivered	
Abbreviated support behaviors	Pre (%)	Post (%)	Pre (%)	Post (%)	Pre (%)	Post (%)	Pre (%)	Post (%)
Academic-related supports								
Assist with completing class assignments	54.2	47.9	10.4	12.0	68.6	43.7	13.1	43.0
Motivate/encourage the student	27.1	26.8	6.9	12.7	47.7	35.8	3.3	33.8
Redirect when the student is off task	36.8	27.5	4.9	4.9	41.2	39.7	2.6	25.8
Help the student participate in a group activity	13.9	12.7	6.3	7.7	11.8	7.3	3.3	13.9
Help student keep organized	21.5	16.2	1.4	2.8	20.3	25.8	0.7	11.3
Sharing class materials other than notes	0.7	0.7	6.3	6.3	1.3	0.7	2.6	9.9
Assist in taking notes or share notes	4.9	2.8	2.1	1.4	2.6	0.7	0.7	7.3
Prompt the student to answer a question	0.7	3.5	1.4	2.1	3.3	4.0	0.0	7.3
Paraphrase lectures or discussions	4.2	4.2	0.0	0.7	6.5	0.7	0.7	2.6
Modify/adapt assignments during class	22.2	16.9	1.4	0.0	21.6	18.5	0.0	4.0
Read aloud a book section or assignment	2.1	3.5	0.7	0.0	3.3	4.0	0.7	2.0
Write down answers given orally/with a device	2.1	0.0	0.0	0.0	5.2	4.0	0.0	2.0
Other academic-related supports	4.9	3.5	2.1	1.4	7.8	0.7	0.7	4.6
None of these supports observed during a period	26.4	32.4	81.9	76.8	19.0	33.8	82.4	34.4
Social-related supports								
Prompt the student to interact with classmates	5.6	2.8	1.4	2.8	9.2	28.5	0.0	4.0
Encourage classmates to interact with the student	2.8	2.1	0.7	1.4	7.2	22.5	0.0	4.0
Praise social/communication attempts/behaviors	0.0	1.4	0.0	2.8	2.0	6.6	0.0	4.0
Provide emotional support or give advice	0.0	1.4	0.0	0.0	0.7	2.6	0.7	4.0
Prompt the student to use AAC device	0.7	0.0	0.0	0.0	0.0	2.6	0.0	2.0
Explicitly teach the student specific social skills	0.0	0.7	0.7	1.4	2.0	3.3	0.0	0.7
Other social-related supports	2.1	2.1	0.0	0.7	2.6	0.7	0.0	1.3
None of these supports observed during a period	93.8	93.7	97.9	96.5	86.9	63.6	99.3	88.1
Other supports								
Help the student self-manage own behaviors	10.4	9.9	4.9	2.8	20.9	10.6	0.7	7.9
Explain class rules	0.0	0.7	0.7	0.0	1.3	0.0	0.0	0.0
Explain class schedule	2.8	2.8	0.7	0.0	2.6	2.0	0.7	0.0
Other	0.7	4.2	0.0	0.0	3.3	2.0	0.0	1.3
None of these supports observed during a period	88.2	88.0	94.4	97.2	77.8	88.1	99.3	92.1
Total number of any type of support per class *M* (*SD*)	2.1 (1.8)	1.8 (1.8)	0.5 (1.3)	0.6 (1.4)	2.8 (1.9)	2.6 (2.4)	0.3 (0.7)	1.9 (1.9)

Note. Percentages sometimes exceed 100% because more than one support could be delivered in a class period. AAC = augmentative and alternative communication.

related supports, or *other supports* (Carter et al., 2011).

Peer comparisons. Using the same observational measures, we collected normative peer comparison data at the beginning of the semester in 53 of the classrooms and at the end of the semester in the remainder. Observers selected peers who (a) did not have severe disabilities and (b) were in close enough proximity to allow for accurate observation. One peer was chosen for the first half of the class and a different peer was observed for the second half; observations were combined to form a class-length observation.

Interobserver agreement. A total of 21 graduate students, staff, and faculty served as classroom observers. Observers discussed coding definitions and scored 100% on quizzes prior to observing. We required observers to meet (a) 90% agreement on practice videos and (b) 80% agreement with a trained observer in classrooms. For more than one third (33.7%) of all observations—balanced across students and time points—a second observer independently collected data. We calculated point-by-point agreement for event-based codes using a 5-s window around the primary observer's data files. We determined total percentage of agreement by dividing the number of agreements by the number of agreements plus disagreements, and multiplying by 100%. We compared duration-based codes on a second-by-second basis and calculated agreement using the same formula (see Table 5). When both observers agreed on the nonoccurrence of interactions, we recorded agreement on frequency codes for that class period.

Student skills. We asked the special education case managers for focus students to complete a packet of assessments at the beginning and end of the semester.

Social skill ratings. The Social Skills Improvement System (SSIS; Gresham & Elliot, 2008) is a widely used, psychometrically strong assessment of behaviors that promote appropriate interactions and the skills needed to manage social situations. It comprises seven subdomains (i.e., communication, cooperation, assertion, responsibility, empathy, engagement, self-control). Teachers rated the frequency with which the focus student exhibited each of the 46 social skill items using a 4-point Likert-type scale (i.e., *never, seldom, often*, and *almost always*). With our own sample, Cronbach's alphas for the seven subdomain raw scores were .92 and .89 for pre- and postintervention scores, respectively. We report standard scores.

Social and academic goal attainment. We used goal attainment scaling (Schlosser, 2004) to measure progress on students' individualized goals within the general education classroom as a way to standardize scoring across content areas and students. Toward the beginning of the semester, special educators crafted one academic and one social-related goal, outlining five measurable outcome levels for each goal. The outcome expected for a student by the end of the semester was assigned a score of 0. An outcome slightly worse than expected was assigned a –1 and an outcome much worse than expected was assigned a –2. Conversely, an outcome slightly better than expected was assigned a +1 and an outcome much better than expected was assigned a +2. At the end of the semester, special educators received the original goals and outcomes and reported the level attained by the student in each area.

Social participation. We collected two measures to assess the social participation of students within general education classrooms and the development of new friendships.

Classroom participation ratings. General educators completed ratings of each focus student's social participation toward the beginning and end of the semester. Using a complete list of all students, teachers rated the extent to which each student in the classroom (a) talked with other peers in this class, (b) actively participated in that class, (c) worked with peers in that class, and (d) had friends in that class. Response options for the first three items were *never, rarely, sometimes*, or *frequently*; options for the last item

Table 5. Interobserver Agreement for Direct Observation Measures.

Measure	Observations of all students and peer comparisons	Observations of focus students only	Observations of peer comparisons only
Social interactions			
Focus students			
Task-related initiation	88.1 (0–100)	87.1 (0–100)	92.5 (0–100)
Task-related response	84.0 (0–100)	82.3 (0–100)	89.2 (50–100)
Social-related initiation	90.2 (0–100)	86.4 (0–100)	93.3 (67–100)
Social-related response	82.9 (0–100)	82.4 (0–100)	81.0 (0–100)
Classmates without disabilities			
Task-related initiation	90.1 (0–100)	90.8 (0–100)	92.2 (50–100)
Task-related response	84.2 (0–100)	82.2 (0–100)	90.9 (50–100)
Social-related initiation	87.8 (0–100)	82.9 (0–100)	93.1 (50–100)
Social-related response	84.2 (0–100)	81.3 (0–100)	85.4 (50–100)
Peer partners			
Task-related initiation	90.1 (33–100)	90.5 (33–100)	n/a
Task-related response	82.9 (0–100)	83.5 (0–100)	n/a
Social-related initiation	91.0 (0–100)	91.6 (0–100)	n/a
Social-related response	86.1 (50–100)	83.3 (0–100)	n/a
Number of peers contacted[a]	0.90 (0.02)	0.92 (0.02)	0.81 (0.07)
Academic engagement			
Engaged-consistent	98.4 (15–100)	98.0 (0–100)	99.9 (99–100)
Engaged-inconsistent	84.1 (0–100)	87.9 (0–100)	99.8 (99–100)
Not engaged	96.7 (0–100)	96.1 (0–100)	96.8 (63–100)
Proximity to			
Peer partners (post only)	97.4 (46–100)	97.5 (46–100)	n/a
Classmates without disabilities	98.0 (0–100)	97.3 (0–100)	99.8 (98–100)
Direct support personnel	93.2 (0–100)	93.2 (0–100)	97.2 (97–98)
Instructional format			
Large group	97.4 (0–100)	96.7 (0–100)	99.4 (92–100)
Small group	94.6 (0–100)	92.8 (0–100)	91.0 (32–100)
Independent work	97.9 (0–100)	96.2 (0–100)	99.2 (95–100)
1:1 peer	95.0 (69–100)	91.6 (0–100)	n/a
1:1 adult	96.9 (44–100)	95.5 (0–100)	100
No instruction	92.9 (0–100)	90.8 (0–100)	98.9 (96–100)
Gone	98.7 (54–100)	98.7 (54–100)	95.8 (88–100)
Support behaviors			
Adult-delivered supports	n/a	95.6 (82–100)	n/a
Peer-delivered supports	n/a	94.5 (73–100)	n/a
Observer ratings[a]			
Reciprocity	0.80 (0.03)	0.77 (0.04)	0.80 (0.03)
Appropriateness	0.89 (0.03)	0.88 (0.03)	0.89 (0.03)
Affect	0.82 (0.03)	0.82 (0.04)	0.82 (0.03)
Response relevance	0.90 (0.03)	0.89 (0.07)	0.90 (0.03)
Overall quality	0.69 (0.04)	0.64 (0.04)	0.68 (0.04)

Note. Values are mean (range).
[a]Overall Cohen's kappa (standard error) is reported for number of peers contacted as well as observer ratings of interaction quality.

were *none, few, some*, or *many*. To gauge the participation of each focus student with respect to the distribution of scores for each classroom, we standardized each classroom's distribution of ratings for each of the four items and a composite score using the standard *z*-score formula. For each classroom, we created cutoffs to identify a percentile rank for students with high, above average, average, below average, or low levels of social participation using 0.5 standard deviations. Cronbach's alphas for the four items were .83 and .85 at pre- and postintervention, respectively.

Friendship gains. We collected data on friendships by having special educators complete our Social Connections and Relationships Assessment (adapted from Kennedy & Itkonen, 1996). We asked them to list every social contact (i.e., an interaction lasting at least 15 min around a shared activity) the focus student had at school during the prior two weeks. For each contact, we requested (a) the first name of the peer, (b) the length of time the student had known the peer (i.e., less than or more than 1 month), (c) the perceived importance of the peer to the focus student (i.e., *not very, somewhat, very important*), (d) whether or not the peer also had a severe disability, (e) whether or not the peer was considered a friend (i.e., someone the focus student considered to be socially important and whom they liked), and (f) whether the peer was a peer partner. In a separate section, we asked respondents to list other peers with whom the focus student had not had a social contact in the prior 2 weeks—but were considered to be friends—along with items (a) through (e) above. We encouraged respondents to ask the focus student and other school staff who knew the student well to provide input when completing the measure. From these responses, we determined the total number of different peers without disabilities considered to be friends of the focus student, new peers identified as friends toward the end of the semester, and peers no longer identified as friends toward the end of the semester. Thus, *friendship gains* reflect the number of new friends at the end of the semester. To gauge the durability of social contacts and relationships, we completed this measure at the midpoint of each of the subsequent two semesters (i.e., one semester and 1 year later).

Social validity. We asked focus students, peers, facilitators, and general educators to share their views on the intervention toward the end of the semester. Focus students with disabilities were asked questions about their peer partners, friendships, and enjoyment of school. Responses were recorded as *yes, no, unsure*, and *unclear* (i.e., the student could not clearly communicate a response); special educators read questions to students, elaborating and recording answers as needed. The facilitator survey included 20 statements addressing the amount of time and support required to implement the intervention, their interest and motivation to implement the intervention, and their perceptions of benefits for participating students, all rated on a 5-point Likert-type scale. Peer partners completed a similar survey that also asked if they would recommend participation to other students and if the school should have more peer supports in the future. The general educator survey included questions similar to the facilitator survey.

Data Analysis

We used descriptive statistics to summarize (a) all observational measures by group and data collection wave, (b) social validity findings, and (c) intervention fidelity measures. To evaluate the efficacy of peer support arrangements relative to the comparison condition, we ran a series of hierarchical linear models (HLMs; Raudenbush & Bryk, 2002) evaluating the effects of condition for each of 11 targeted outcome variables using the software Hierarchical Linear and Nonlinear Modeling 7 while accounting for nesting of students within schools. The targeted outcome variables were identified prior to data analysis and selected based on our interest in understanding the impacts of peer support arrangements on classroom behavior, skill acquisition, and connections with peers. All data were screened prior to analysis for nonnormality and potential outliers.

Classroom observations. Observational variables were collected for all students three times prior to the intervention and three times after the intervention. This data structure permits a three-level analysis, where the first level considers repeated measures within student (i.e., up to six observations per student) that are modeled as a function of a single dummy variable reflecting the postintervention (versus preintervention) time period. This modeling framework introduces a subject parameter representing the pre to post change in the observational variable which can in turn be modeled as a function of the intervention condition to which the student was assigned. Statistically, the Level 1 model can be written as

$$OBSERV_{tjk} = \pi_{0jk} + \pi_{1jk} * \left(POST_{tjk} \right) + e_{tjk}$$

where $OBSERV_{tjk}$ represents the measure of an observational variable at time t for student j from school k, $POST_{tjk}$ is a dummy variable (0 = preintervention, 1 = postintervention) identifying the time period in which the measure was observed, π_{0jk} represents the expected value for *OBSERV* for the student during the preintervention period, π_{1jk} is the expected change from the pre- to postintervention period, and e_{tjk} is an error term. The π_{0jk} and π_{1jk} effects are modeled at Level 2 (student level) as

$$\pi_{0jk} = \beta_{00k} + \beta_{01k} * \left(PSGROUP_{jk} \right) + r_{0jk}$$
$$\pi_{1jk} = \beta_{10k} + \beta_{11k} * \left(PSGROUP_{jk} \right) + r_{1jk}$$

where $PSGROUP_{jk}$ is a dummy variable indicating whether student j from school k is in the control (= 0) or peer support (= 1) condition. As a result, β_{00k} and β_{01k} correspond to the expected preintervention scores in the comparison condition, and the expected difference in preintervention scores between the peer support and comparison conditions, respectively, for school k. The β_{10k} and β_{11k} coefficients correspond to the expected change from preintervention to postintervention within school k. Specifically, β_{10k} represents the expected change in the comparison condition, while β_{11k} represents the difference in expected change between the peer support and comparison conditions. The terms r_{0jk} and r_{1jk} represent residual student-level variance.

The Level 3 model attends to school effects and is written as

$$\beta_{00k} = \gamma_{000} + u_{00k}$$
$$\beta_{01k} = \gamma_{010}$$
$$\beta_{10k} = \gamma_{100} + u_{10k}$$
$$\beta_{11k} = \gamma_{110}$$

where γ_{000} represents the overall average preintervention score in the comparison condition, γ_{010} the average difference between peer support and comparison students at preintervention, γ_{100} the average change from pre to post in the comparison condition, and γ_{110} the average difference in change between peer support and comparison students. The random intercept terms, u_{00k} and u_{10k} account for potential school-level variability in both the overall preintervention scores and mean change in the scores from pre to post intervention across both the comparison and peer-support conditions. Our primary hypothesis concerning the effects of the peer support intervention on change from pre to post is tested through the γ_{110} parameter, where nonzero values imply a differential change in outcome related to peer support. We analyzed six observational variables with this framework: total interactions, focus student interactions, number of different peers contacted, academic engagement activities, proximity to adults, and time gone from class.

Student skills and social participation. For the five teacher-reported measures (i.e., social skills, classroom participation, social goal attainment, academic goal attainment, friendship gains), we collected either a single pre- and a single postintervention measurement (for the first two measures) or only a postintervention measurement (the last three measures). We therefore fit two-level models in which students were nested within schools and the postintervention measurement is the

outcome variable. For the first two measures only, we introduce the preintervention score as a covariate. The Level 1 models can thus be written as

$$(a)\, POST\_Score_{jk} = \beta_{0k} + \beta_{1k} * \left(PSGROUP_{jk}\right) + \beta_{2k} * \left(PRE\_Score_{jk}\right) + r_{jk}, \text{ or}$$
$$(b)\, POST\_Score_{jk} = \beta_{0k} + \beta_{1k} * (PSGROUP_{jk}) + r_{jk}$$

where $POST\_Score_{jk}$ and PRE_Score_{jk} represent the measurements at post and pre for student j in school k, and $PSGROUP_{jk}$ is again a dummy variable identifying intervention condition (0 = comparison; 1 = peer support). The parameter β_{0k} represents either the expected residualized gain score in school k for the comparison condition when controlling for the pre score (model a), or the expected score in school k for the comparison condition (model b). The parameter β_{1k} indicates the expected change in either of these scores for students in the peer support condition, and r_{jk} is a residual term. At Level 2 (the school level), the Level 1 effects are modeled as

$$\beta_{0k} = \gamma_{00} + u_{0k}$$
$$\beta_{1k} = \gamma_{10}$$
$$\left(\beta_{2k} = \gamma_{20}\right)$$

where the equation in parentheses is only included for analyses involving a pre score, namely the first two outcomes. The parameters $\gamma_{00,}$ $\gamma_{10,}$ and γ_{20} reflect the average residualized gain (alternatively, the average outcome) across schools in the comparison condition, the average difference between peer support and comparison students on the residualized gain (alternatively the average outcome), and the fixed effect of the preintervention score on postintervention score, respectively. Hypotheses regarding intervention effects attend to the significance of the γ_{10} coefficient.

We examined effect sizes in terms of a Cohen's *d* coefficient, where the unstandardized coefficient for the peer support group at postintervention (the γ_{110} and γ_{10} coefficient estimates in the three-level and two-level models, respectively) is divided by the pooled within-group standard deviation of the respective dependent variable. Effect size magnitudes of 0.20, 0.50, and 0.80 are generally considered small, medium, and large effects, respectively (Cohen, 1988).

Although our primary analyses assume normality, we also carried out robustness checks in cases where normality seemed suspect. Specifically, for two of the count-based outcome variables (i.e., total interactions, peers contacted) we also conducted Poisson regression analyses. We also conducted further exploratory analyses aimed at testing whether an ASD classification moderated the effects of peer supports on each of the outcome variables. In these analyses we added an effect coded ASD variable (1 = *ASD*, –1 = *not ASD*), and a product variable between ASD and the peer support dummy variable, as predictors in the student-level equations of the model. Our primary interest was in the significance of the product variable, as such an observation would imply a differential intervention effect for students with versus without ASD.

Results

Classroom Observations

Descriptive statistics for all classroom observation measures are displayed in Table 3, alongside normative comparison data from peers without disabilities. We focused *a priori* group comparisons on six of these measures. Table 6 summarizes estimates of preintervention fixed effects across the outcome variables as well as effect size estimates based on the three-level HLM analysis. The two groups did not differ significantly on any of these observational measures at preintervention, as evidenced by the lack of significance of the γ_{010} coefficients.

In terms of postintervention effects, the fixed effect γ_{100} estimates the average change of the outcome variable from pre- to postintervention for the comparison group, whereas γ_{110} estimates the average difference in the pre- to postintervention change for the peer support group relative to the comparison's

average postintervention change (see Table 6). Students in the comparison group had significant increases in total interactions across the semester ($\gamma_{100} = 13.10$, $p = .004$); however, students in the peer support intervention had a significantly greater change in total interactions relative to the comparison group ($\gamma_{110} = 25.05$, $p < .001$; $d = 0.42$). As shown in Table 3, a somewhat higher proportion of the interactions of students in the peer support group focused on task- versus social-related topics. Total interactions took place at slightly more than half the rate of peer comparisons. Gains were not due solely to the interactive behavior of peers, as the contributions of the focus students to interactions also increased a significantly greater amount in the peer support group relative to the comparison group ($\gamma_{110} = 10.07$, $p = .005$). Students receiving peer supports initiated an average of 6.3 times per hour (versus 11.5 times per hour for peers) and responded an average of 16.1 times per hour (versus 16.6 times per hour for peers), representing a small to medium sized effect ($d = 0.34$). Observers rated the interactions as fairly reciprocal, appropriate, response relevant, and of moderately high quality overall. In terms of the number of different peers with whom the focus student had social contact during class periods, there was a significant gain in the comparison condition ($\gamma_{100} = 0.39$, $p = .007$), but students in the peer support condition again showed a statistically greater increase ($\gamma_{110} = 0.91$, $p = .001$; $d = 0.50$). At postintervention, students in the comparison and peer support groups interacted with an average of 1.6 and 2.5 classmates per period, respectively.

Academic engagement for students in the comparison group decreased by 3.9% at postintervention to an average of 58.3% of the class period, but this change was not significant ($\gamma_{100} = –0.04$, $p = .087$). For students receiving peer support arrangements, academic engagement increased by 6.9% to an average of 71.1% of the class period, a significant improvement relative to the comparison group ($\gamma_{110} = 0.11$, $p = .012$; $d = 0.31$). Although proximity to direct support staff decreased by 6.4% to an average of 42.3% for students in the comparison group, this change was not significant ($\gamma_{100} = –0.06$, $p = .081$). For students in the peer support group, proximity decreased by 19.5% to an average of 31.1% of the class period, but this change was not significantly different from that of the comparison ($\gamma_{110} = –0.13$, $p = .071$; $d = –0.38$). Differences were also noted in amount of time students were gone from the classroom. For the comparison group, the amount of time students were gone from the classroom significantly increased by 3.4% to 18.2% of the class period ($\gamma_{100} = 0.04$, $p = .024$); for the peer support group, the percentage of time students were gone decreased significantly to 11.2% of the class period ($\gamma_{110} = –0.09$, $p < .001$; $d = –0.45$). As noted earlier, each of these analyses controlled for school effects related to these outcomes.

Student Skills

We focused our group comparisons on social skills ratings, social goal attainment, and academic goal attainment. Only the SSIS measure had a preintervention score and the two groups did not differ significantly from one another on this measure, $t(97) = –0.76$, $p = .44$. Improvements on social goals were significantly higher for students in the peer support group than students in the comparison group ($\gamma_{10} = 0.80$, $p < .001$; $d = 0.79$). On a scale ranging from –2 to +2, mean scores for students in the comparison group were 0.25 compared to 0.98 for students in the peer support group. Although improvements in academic goals were also slightly higher for students in the peer support group versus comparison group (0.55 versus 0.17), those differences were not significant ($\gamma_{10} = 0.38$, $p = .065$; $d = 0.35$). No differences in improvements on the SSIS were found across groups ($\gamma_{10} = 2.33$, $p = .147$; $d = 0.17$).

Social Participation

Only the classroom social participation measure had a preintervention score, and the groups did not differ significantly from one another here, $t(95) = –0.60$, $p = .55$. Although students in the comparison group improved

Table 6. Fixed Effects of Peer Support Intervention.

Dependent variable	Independent variable	Estimate	*SE*	*t*-ratio	*df*	*p* value	ES[a]
Total interactions	Intercept, γ_{000}	17.19	5.89	2.92	20	.008	
	PSGROUP, γ_{010}	–5.15	7.11	–0.72	55	.472	
	POST, γ_{100}	13.10	4.08	3.21	20	.004	
	POST*PSGROUP, γ_{110}	25.05	7.12	3.52	55	<.001	0.42
Focus student contributions	Intercept, γ_{000}	8.38	2.77	3.02	20	.007	
	PSGROUP, γ_{010}	–3.19	3.44	–0.93	55	.357	
	POST, γ_{100}	6.96	2.12	3.27	20	.004	
	POST*PSGROUP, γ_{110}	10.07	3.43	2.93	55	.005	0.34
Peers contacted	Intercept, γ_{000}	1.13	0.22	5.19	20	<.001	
	PSGROUP, γ_{010}	–0.05	0.29	–0.19	55	.849	
	POST, γ_{100}	0.39	0.13	3.01	20	.007	
	POST*PSGROUP, γ_{110}	0.91	0.27	3.41	55	.001	0.50
Academic engagement	Intercept, γ_{000}	0.62	0.04	15.50	20	<.001	
	PSGROUP, γ_{010}	0.01	0.04	0.33	55	.740	
	POST, γ_{100}	–0.04	0.02	–1.80	20	.087	
	POST*PSGROUP, γ_{110}	0.11	0.04	2.60	55	.012	0.31
Proximity to direct support	Intercept, γ_{000}	0.48	0.04	13.09	20	<.001	
	PSGROUP, γ_{010}	0.03	0.05	0.60	55	.542	
	POST, γ_{100}	–0.06	0.04	–1.84	20	.081	
	POST*PSGROUP, γ_{110}	–0.13	0.07	–1.84	55	.071	–0.38
Gone from classroom	Intercept, γ_{000}	0.16	0.04	4.62	20	<.001	
	PSGROUP, γ_{010}	0.00	0.03	0.02	55	.984	
	POST, γ_{100}	0.04	0.02	2.45	20	.024	
	POST*PSGROUP, γ_{110}	–0.09	0.02	–3.63	55	<.001	–0.45
Social skill ratings	Intercept, γ_{00}	24.04	3.96	6.07	20	<.001	
	PSGROUP, γ_{10}	2.33	1.59	1.46	76	.147	0.17
	PRE_SSIS, γ_{20}	0.73	0.05	15.74	76	<.001	
Social goal attainment	Intercept, γ_{00}	0.23	0.17	1.37	20	.186	
	PSGROUP, γ_{10}	0.80	0.18	4.46	77	<.001	0.79
Academic goal attainment	Intercept, γ_{00}	0.17	0.17	1.04	20	.313	
	PSGROUP, γ_{10}	0.38	0.20	1.87	76	.065	0.35
Classroom participation	Intercept, γ_{00}	–0.09	0.12	–0.76	20	.450	
	PSGROUP, γ_{10}	0.48	0.17	2.18	74	.006	0.42
	PRE_ZScore, γ_{20}	0.70	0.06	11.04	74	<.001	
Friendship gains	Intercept, γ_{00}	0.60	0.19	3.14	20	.005	
	PSGROUP, γ_{10}	1.65	0.38	4.39	77	<.001	1.02

Notes. Final estimation of fixed effects with robust standard errors.
[a]Cohen's *d* using unstandardized regression coefficients.

slightly in their social participation scores by the end of the semester, their ratings did not change significantly ($\gamma_{00} = –0.09$; $p = .45$). In contrast, students in the peer support group received significantly greater gains in ratings over the course of the semester relative to the comparison group ($\gamma_{10} = 0.48$; $p = .006$; $d = 0.42$). Similarly, students in the peer support group gained significantly more friends without disabilities than students in the comparison group (2.25 versus 0.60; $\gamma_{10} = 1.65$; $p < .001$; $d = 1.02$).

The extent to which relationships with peer partners maintained beyond the semester of the intervention was somewhat high. Among the 106 peer partners who stayed involved

until the end of the semester, 40% ($n = 42$) were reported to have had an extended social contact with the student during a 2-week window toward the middle of the following semester and 43% ($n = 45$) were reported as being friends. During the 1-year follow up 16% ($n = 17$) of these peer partners were reported to have had an extended social contact with the student during a 2-week window toward the middle of the semester and 40% ($n = 42$) were reported to be friends.

Exploratory Analyses Related to ASD

To explore the extent to which intervention impact might be different for students with severe disabilities based on whether they had ASD. we also ran all HLM models studying ASD as a moderator variable. Coefficients and results of statistical tests were consistent with results from our primary analyses and failed to suggest many meaningful differences in the effects of the peer support intervention for students with ASD. In particular, the interaction terms related to the ASD and peer support variables were consistently nonsignificant, suggesting the intervention had a similar impact for students with and without autism. Data are available by request from the authors.

Social Validity

As shown in Table 7, the majority of focus students indicated they enjoyed working with their peers, considered the peers their friends, and wanted to continue working together. Peer partners generally agreed that they felt confident and effective in their roles, found it easy to get their own work done, would recommend this role for other peers, wanted to serve in this role again, and considered the focus student to be a friend. Overall, facilitators considered the implementation time to be reasonable, they reported understanding the procedures, they were motivated to use the intervention with other students, and they felt participating students with and without disabilities benefited. General educators were also fairly positive, noting the amount of time required was reasonable and the strategy fit well within their classroom. However, their readiness to use the strategies in the future was more tempered (see Table 8).

Discussion

Despite decades of debate and discussion, critical questions endure about how best to support the meaningful participation of students with severe disabilities in general education classrooms. Prevailing practice involves assigning paraprofessionals as a primary pathway for supporting students to access instruction from the general education teacher. Yet an absence of empirical backing for this support model—along with a host of conceptual concerns—has challenged the field to explore alternative approaches. We evaluated the efficacy and social validity of peer support arrangements as one approach for supporting the relationships and learning of adolescents with severe disabilities. Across a large sample of students with and without disabilities attending a diverse set of classrooms and schools, we found that school staff implementation of peer support arrangements offered distinct advantages over an exclusive reliance on assistance from individually assigned special education staff. Findings from this study extend the literature on supporting general education access in several ways.

First, the social and academic benefits of peer support arrangements were fairly striking. One perennial argument for the inclusion of students with severe disabilities has been the new communication and relationship opportunities general education participation is presumed to introduce (e.g., Carter & Brock, 2015; McLeskey et al., 2014). Peer support arrangements were found to substantially expand these opportunities by producing significant increases in the interactions students with disabilities had with peers, the number of different classmates with whom they conversed, and the extent to which they made progress on social-related goals. Although prior studies have also documented improvements in social interactions using within-participant comparisons (e.g., Shukla et al., 1998, 1999),

Table 7. Perspectives of Students With Severe Disabilities.

	Focus student response			
Social validity items	Yes (%)	No (%)	Unsure (%)	Unclear (%)
Do you like going to school?	84.0	12.0	0.0	4.0
Do you have friends at school?	90.0	4.0	2.0	4.0
Do you like this class?	86.0	4.0	4.0	6.0
Did you learn new things in this class?	90.0	4.0	4.0	2.0
Did you like working with [names of peer supports] in this class?	94.0	0.0	2.0	4.0
Did working with [names of peer supports] help you learn new things?	86.0	2.0	6.0	4.0
Are [names of peer supports] your friends?	94.0	0.0	2.0	4.0
Would you like to keep working with [names of peer supports]?	92.0	0.0	4.0	4.0

Note. Data are missing for one student (n = 50). Numbers reflect percentage of focus students endorsing each option. *Unsure* was recorded if the student communicated he or she was not certain of the answer. *Unclear* was recorded if the student could not reliably communicate his or her perspective.

our use of a randomized design enabled us to document semester-long gains beyond those naturally occurring for students not receiving targeted intervention. In other words, students in the comparison group also experienced more peer interactions as the semester progressed, albeit at modest levels (i.e., nearly doubling their rate of interaction versus more than quadrupling for students receiving the intervention).

Prior single-case studies have provided a mixed picture of the academic benefits of these interventions; some students maintained prior levels of academic engagement, while others improved (e.g., Carter et al., 2007; Carter et al., 2011). In our study, toward the end of the semester students involved in peer support arrangements were engaged in consistent activities (i.e., the same activities provided by the classroom teacher to all students) significantly more than students in the comparison group (71% vs. 58% of the class period). Moreover, students spent significantly less time out of the classroom and were rated by general educators as having more active classroom participation. Such gains came even as the close proximity and direct academic assistance of special education staff diminished. Increased engagement may be explained in part by the prominence of task-related conversations among students with and without severe disabilities and the emphasis placed on exchanging academic-related supports. Indeed, written peer support plans outlined specific ways peers could encourage participation in ongoing class activities. We emphasize that peers are not replacements for instruction from classroom teachers, but instead support involvement in shared learning opportunities provided by the classroom teacher. Rather than pulling students with disabilities away from instruction in pursuit of social outcomes, working with peers appears to engage students more fully in activities planned by the general educator for all members of the class.

Peers are not replacements for instruction from classroom teachers, but instead support involvement in shared learning opportunities provided by the classroom teacher.

Second, we examined more closely the nature of students' interactions and relationships as part of peer support interventions. For example, our normative comparison data of students without severe disabilities indicate peer interactions—especially those focused on social-related topics unrelated to class

Table 8. Perspectives of Intervention Facilitators, General Educators, and Peer Partners.

Social validity items	Facilitators (*n* = 51)	General educators (*n* = 49)	Peer partners (*n* = 106)
The student with a disability [my partner] benefitted *socially* from having a peer support (e.g., talks more with peers, has more friends).	4.5 (0.7)	4.4 (0.8)	4.0 (0.7)
The student with a disability [my partner] benefitted *academically* from having a peer support (e.g., participates more in class, learns new skills).	3.7 (0.9)	3.6 (0.9)	3.8 (0.7)
The peers without disabilities [I] benefitted *socially* from being a peer support.	4.2 (0.7)	3.9 (0.7)	3.9 (0.8)
The peers without disabilities [I] benefitted *academically* from being a peer support.	3.4 (0.8)	3.4 (1.0)	3.5 (0.8)
Overall, I enjoyed participating [being] in this project.	4.6 (0.5)	4.2 (0.7)	4.5 (0.6)
The amount of time required to use this strategy was reasonable.	4.3 (0.6)	4.4 (0.7)	—
I would need ongoing consultation to keep implementing this strategy.	2.2 (0.8)	3.0 (1.0)	—
Implementation of this strategy required considerable support from other school staff.	2.8 (1.1)	2.9 (0.9)	—
I am motivated to continue using this strategy.	4.4 (0.6)	4.0 (0.6)	—
I would not be interested in implementing this strategy again.	1.8 (1.0)	2.2 (1.2)	—
This strategy was a good way to address the educational needs of the student with a disability.	4.2 (0.7)	4.3 (0. 7)	—
This strategy fits well within this classroom.	4.1 (0.9)	4.3 (0.8)	—
I understood the procedures of this strategy.	4.4 (0.6)	3.9 (0.9)	—
I would know what to do if I was asked to implement this strategy again in the future.	4.6 (0.5)	3.7 (0.9)	—
The student with a disability has more friends as a result of this project.	4.0 (0.9)	3.8 (0.9)	—
This strategy negatively impacted other students in the class.	1.6 (0.7)	1.7 (0.8)	—
I could use the strategies I learned through this project with other students.	4.5 (0.5)	4.0 (0.7)	—
The amount of time for record keeping with this strategy was reasonable.	4.3 (0.5)	—	—
I feel I was effective in this role.	4.2 (0.7)	—	—
I implemented this strategy with a good deal of enthusiasm.	4.3 (0.6)	—	—
I often use cooperative learning strategies with students in my classroom.	—	4.1 (0.7)	—
The peer support strategy would be feasible for me to implement if additional school staff were not in my classroom.	—	3.3 (1.0)	—
This strategy was a good way to address the educational needs of students without disabilities.	—	3.8 (0.7)	—
At first, I was excited to become a peer partner.	—	—	4.2 (0.7)
I felt confident serving in this role	—	—	4.1 (0.7)
I had enough help from a teacher or teaching assistant (i.e., paraprofessional) to do this role well.	—	—	4.4 (0.7)
This was too much work for me.	—	—	1.6 (0.8)
I feel I was effective in this role.	—	—	3.8 (0.7)

(continued)

Table 8. (continued)

Social validity items	Facilitators (n = 51)	General educators (n = 49)	Peer partners (n = 106)
It was easy to get my own work done while part of this project.	—	—	4.2 (0.7)
The initial orientation meeting with a teacher/paraprofessional was helpful.	—	—	4.2 (0.7)
Other students in the class should also do this.	—	—	4.2 (0.7)
I would be a peer support again in the future.	—	—	4.3 (0.6)
I understand why the teachers thought peer supports would be helpful for my partner with a disability.	—	—	4.2 (0.7)
Our school should have more peer supports for students with disabilities.	—	—	4.5 (0.7)
I consider my partner with disabilities to be a friend.	—	—	4.3 (0.6)
I would recommend being a peer support to my other friends.	—	—	4.3 (0.7)
My views about students with disabilities have changed for the better.	—	—	4.4 (0.7)
I also spend time with other students who have similar disabilities at my school.	—	—	3.4 (1.0)

Note. Adult wording [peer wording, if different]. Numbers reflect means (standard deviations) on a 5-point scale ranging from *strongly disagree* (1) to *strongly agree* (5). A blank cell indicates the question was not asked of that stakeholder.

content—may be fairly typical within high school classrooms. Although overall rates of peer interaction for students with severe disabilities receiving the intervention were lower than those of their classmates without disabilities, their rates of task-related interactions were comparable. In other words, the intervention appears to facilitate content-appropriate peer interactions in classrooms already replete with potential interaction opportunities. Questions that once were directed to a paraprofessional may now be extended to a peer, and feedback offered only by a paraprofessional may instead be shared by classmates.

Particularly intriguing are data speaking to the types of peer relationships emerging from these interactions. Questions have been raised about the extent to which peer-mediated interventions will lead to friendships (Rossetti, 2011) and the longer-term impact of different educational support models has been largely unexplored (Ryndak, Alper, Hughes, & McDonnell, 2012). We found that "friendships" best characterized the relationships of substantial numbers of participating students with and without disabilities. This conclusion was affirmed by students with severe disabilities (94% of whom said their partners were their friends), reciprocated by peer partners (96% of whom agreed the focus student was a friend), and triangulated in the social network assessments and end-of-semester questionnaires completed by paraprofessionals, special educators, and general educators. Still somewhat surprising, however, was the extent to which students with disabilities and their peers met together socially and were considered friends after the intervention concluded and any external expectations for connecting with one another were removed. Amidst changing class schedules and the crossing of a summer, we were struck by the percentage of peer partners with whom students still had some social contact one and two semesters later, as well as the percentage of peer partners considered to be

friends over this same time frame. Additional research is needed to explore more closely those factors leading to the formation and maintenance of these relationships over time.

Third, available social validity and fidelity data suggest peer support interventions are feasible to implement within secondary school classrooms and are viewed favorably by critical stakeholders. A long-standing concern within the field of special education has been the degree to which interventions recommended in the literature are doable and desirable in real schools. We sought to equip school staff to lead in the planning and facilitation of peer support interventions while minimizing the involvement of the research team. Although we provided the initial training of the intervention facilitators, attended the first orientation meeting with peers, and were periodically present in the classroom, our role was to observe and offer coaching to the facilitators as they served as the primary implementer. All of the facilitators were successful in recruiting peers, carrying out initial orientation meetings, and supporting participating students as they worked together. Amidst the fairly modest amount of training and coaching we provided, these facilitators were ultimately able to carry out the semester-long interventions in ways that led to meaningful improvements in social and academic outcomes. However, further research focused on the "scaling up" of these interventions is still sorely needed. Brock and Carter (2015) showed that special educators could effectively guide paraprofessionals to implement peer support arrangements without extensive researcher involvement. Yet increasing general educators' engagement with and active responsibility for all students enrolled in their classes is critical to ensuring these interventions will be implemented and sustained in typical schools. Although all general educators in our study were supportive of peer support arrangements, a stronger team-based approach may need to be incorporated at the outset of this intervention to enable more widespread adoption.

We also found that most students with disabilities wanted to continue working with their peers, most peer partners indicated an interest in assuming this role again in the future, most paraprofessionals were motivated to continue using the strategies, and most teachers said the intervention fit well within their classroom. Collectively, these stakeholders affirmed the benefits of these interventions for students with disabilities, peers, and staff alike. When such strong endorsements are considered alongside the free cost and limited out-of-class time required to plan and implement these interventions, one might expect peer support arrangements to be widely adopted in secondary schools. Yet we see few examples of these peer-mediated models implemented outside of formal research partnerships. Additional attention should focus on understanding what spurs and sustains the implementation of evidence-based strategies in schools and how best to ensure effective interventions ultimately penetrate practice.

Additional attention should focus on understanding what spurs and sustains the implementation of evidence-based strategies in schools and how best to ensure effective interventions ultimately penetrate practice.

Fourth, a close examination of implementation data highlights some of the complexities and considerations associated with documenting intervention fidelity and delineating the critical elements of this approach. Peer support arrangements are flexible interventions that can and should be adapted to meet the individualized needs of a student with a disability enrolled in a particular general education classroom. Although we delineated the core elements of this model (i.e., the recruitment, training, and proximity of peers; the provision of social and/or academic supports by those peers; the facilitation of shared work by school staff), the specific supports peers and paraprofessionals provide can vary by

student, activity, classroom, and day (see Tables 3 and 4). Thus, we described rather than prescribed these supports in an effort to characterize more fully the implementation of peer supports under conditions that more closely resemble actual practice. This flexibility—reflected in the variability with which particular intervention components and supports were observed both within and across students—may enhance the social validity of this support model. But it also leaves open the possibility that opportunities to optimize intervention impact are being missed. Striking the best balance between intervention fidelity and individualization is an important issue that warrants additional attention.

Limitations and Future Research

Future research is needed to address several limitations of this study. First, friendship data were reported by adults rather than students. Although these findings were corroborated in social validity ratings, respondents were asked to consult students, and educators have a prominent presence in the lives of students with severe disabilities; it is possible adults under- or overreported the social connections of students. Future studies are needed to explore alternative approaches for documenting these social affiliations. Second, although this is the first study to look at the longer-term friendship outcomes of peer-mediated interventions, our exploration of the generalization of intervention outcomes was limited to this measure. Future studies should explore how more proximal social and learning outcomes spill over to any other general education classes in which the focus student is enrolled. Third, our ability to capture changes in learning was limited to two measures: observations of academic engagement and ratings of progress on a single academic-related goal. Although the present study revealed promising gains on both measures and addresses the extent to which students are accessing the general curriculum, future studies are needed to better document the extent to which students are making progress in the academic curriculum through this intervention. Fourth, we did not explore the effect of these interventions on the social and academic participation of the peers who provided support. Although peers said they personally benefitted from involvement and affirmed the intervention did not cause them to fall behind, additional studies are needed to better capture how the learning and social affiliations of peers are impacted by serving in this role. Finally, we did not collect data on the extent to which special educators, paraprofessionals, and general educators collaborated during the planning and implementation of peer-mediated and other classroom supports throughout the semester. We share concerns cited elsewhere in the literature about the relative autonomy many paraprofessionals are given in relation to the education of students with severe disabilities. Future studies should explore how strengthening these collaborations affects implementation fidelity, student outcomes, and the long-term sustainability of these approaches in typical schools.

Conclusion

Findings from this study—in combination with a growing number of published single-case evaluations—challenge the burgeoning reliance on individually assigned adults as the primary avenue for supporting the active participation of adolescents with severe disabilities in general education classrooms. For secondary schools, this study describes one promising pathway for meeting mandates related to supporting access to the general education curriculum for students with severe disabilities. At the same time, it should prompt reflection among school leaders regarding the roles paraprofessionals are asked—or left—to assume in the education of students with severe disabilities. Like all of their classmates without disabilities, students with severe disabilities should have well-supported opportunities to learn from the deep knowledge and expertise of general educators. Paraprofessionals are not an appropriate substitute for access to highly qualified educators—and neither are peers. Instead, peers and paraprofessionals together can play a valuable supplementary role in helping students with severe disabilities

access the rich learning and social opportunities general education teachers provide in their classrooms.

Peer support arrangements are only one component of high-quality inclusion for students with severe disabilities. Future research is needed to explore how to best to improve other aspects of inclusion, including ongoing collaboration between general and special educators, as well as data-based instruction of goals related to the general education curriculum and the student's individualized education program.

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