Efficacy of Teachers Training Paraprofessionals to Implement Peer Support Arrangements

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Abstract

Although peer support arrangements are a promising strategy to promote inclusion in general education classrooms, previous studies have not addressed how paraprofessionals might implement this strategy under typical circumstances without extensive researcher involvement. In this single-case design study, four special education teachers trained and supported four paraprofessionals to implement peer support arrangements through delivery of a professional development package consisting of an initial orientation, video modeling, and brief coaching with performance feedback. Teachers implemented the professional development accurately, paraprofessionals implemented peer support arrangements with fidelity, and three of the four middle school students with severe disabilities increased their social interactions with peers while maintaining previous levels of academic engagement. These findings suggest a possible avenue for equipping paraprofessionals to implement peer support arrangements. Recommendations for preparing teachers to train and support paraprofessionals to implement intervention strategies are offered along with directions for future research.

General education classrooms represent an especially important context for middle school students with severe disabilities (i.e., students with intellectual disability or autism spectrum disorder who are eligible for alternate assessment) to build social competence and connections with peers. Outside of their involvement in general education classrooms, middle and high school students with severe disabilities typically have few opportunities to interact with their peers without disabilities (Wagner, Cadwallader, Garz, & Cameto, 2004). However, physical presence in general education classrooms alone—without well-planned and implemented supports—rarely results in improved social outcomes for students with severe disabilities. Descriptive studies have shown that without well-planned supports, adolescents with severe disabilities who attend general education classes rarely interact with their peers (e.g., Chung, Carter, & Sisco, 2012). When peer interactions do occur, they may be inappropriate or negative (Humphrey & Symes, 2011).

As a result, researchers have focused growing attention on exploring how best to support the successful social and academic engagement of students with severe disabilities within inclusive classrooms (for a review, see Carter, Sisco, Chung, & Stanton-Chapman, 2010).

One promising strategy for promoting social outcomes in general education classrooms is peer support arrangements (Carter, Moss, Hoffman, Chung, & Sisco, 2011; Carter, Sisco, Melekoglu, & Kurkowski, 2007; Shukla, Kennedy, & Cushing, 1998, 1999). Peer support

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arrangements involve one or more peers without disabilities providing ongoing social and academic support to classmates with disabilities in a general education classroom. A paraprofessional facilitates the peer support arrangement by inviting one or more peers to provide support to a student with a severe disability, orienting peers to their new roles, and identifying specific ways they might provide needed supports. Peers might provide support in a variety of ways, depending on the characteristic of the student with a disability and the activities taking place within the classroom. Examples of common peer roles include encouraging a student to ask questions or contribute to class discussions, scribing verbal answers or responses provided through augmentative and alternative communication, supporting involvement in small-group activities, and summarizing key ideas from lectures. As students gain confidence working together, paraprofessionals shift to a facilitative role by coaching, supervising, and providing feedback to peers who provide support (Carter et al., 2011). As emphasized elsewhere in the literature (Giangreco, 2010), any paraprofessional-implemented support strategy—including peer support arrangements—should be supplemental to primary instruction as well as closely supervised by highly qualified teachers.

Four single-case design studies have shown that paraprofessionals can assist in implementing peer support arrangements in ways that improve outcomes for middle and high school students with severe disabilities by increasing peer interaction without negatively affecting academic engagement. In two studies using a reversal design, Shukla et al. (1998, 1999) investigated the effects of peer support arrangements for five middle school students with moderate or severe intellectual disability. Compared to paraprofessional direct support, both studies showed peer support arrangements resulted in more frequent and longer interactions with peers and similar or slightly increased levels of engagement in class activities. In two studies using a multiple-baseline-across-participants design, Carter and colleagues (Carter et al., 2007, 2011) studied the effects of peer support arrangements for seven high school students with moderate or severe intellectual disability. In both studies,

peer support resulted in more frequent social interactions with peers compared to an exclusive reliance on adult-directed support. Academic engagement maintained across phases.

Although peer support arrangements represent a promising avenue for promoting social outcomes in general education settings, replicating this practice under typical conditions remains a challenge. Prior studies involve researchers either directly implementing key components of the intervention (Carter et al., 2007, 2011), or providing intensive, ongoing support to paraprofessionals (Shukla et al., 1998, 1999). Given this heavy researcher involvement, these studies do not provide a replicable model for how to train and support paraprofessionals to implement peer support arrangements under typical circumstances. In fact, few validated models exist for preparing paraprofessionals to implement *any* intervention for students with severe disabilities (Brock & Carter, 2013b).

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In a recent systematic review, Brock and Carter (2013b) found only 13 experimental studies focused on training paraprofessionals to implement any type of intervention for students with intellectual or developmental disabilities. Nearly all studies in this review involved one-to-one coaching or mentoring where a professional development coach delivered individualized follow-up training to the paraprofessional. Within this context of one-to-one coaching, three components were included in intervention packages associated with paraprofessional acquisition of correct delivery of instruction: modeling, performance feedback, and accountability. Brock and Carter (2013a) combined these three components into a flexible and replicable training package comprising an initial training workshop followed by video modeling and brief on-site coaching. Results from this small randomized controlled trial were promising. Twenty-five paraprofessionals were taught to

implement constant time delay, a simple behavioral intervention for systematically fading prompts. Compared to paraprofessionals receiving only a stand-alone training workshop, paraprofessionals receiving video modeling and on-site coaching implemented constant time delay with far superior fidelity (d = 2.67). One critical limitation of this pilot study was that the training was provided by researchers rather than school-based staff. The individuals best positioned to provide widespread sustainable training to paraprofessionals may be the special educators who are charged with directing and closely supervising any support or instruction provided to students (Individuals With Disabilities Education Act, 2006).

In the present study, we investigated whether teacher-delivered professional development enables paraprofessionals to implement peer support arrangements with fidelity and whether implementation of peer support arrangements results in improved outcomes for students with severe disabilities. Specifically, we addressed the following research questions: First, does a teacher-delivered professional development package consisting of an initial training session, video modeling, and coaching with performance feedback improve paraprofessional implementation fidelity of peer support arrangements? Second, do peer support arrangements facilitated by paraprofessionals result in improved social and academic outcomes for middle school students with severe disabilities? In answering this question, we drew upon student-level outcomes from previous studies in order examine the impact of paraprofessional training on similar measures. Third, how do special educators and paraprofessionals view the feasibility and acceptability of the professional development package?

Method

Students With Disabilities, Paraprofessionals, and Special Educators

After receiving institutional review board and district approval, we recruited four triads of students with severe disabilities, paraprofessionals, and supervising special educators. To be included, students had to (a) be enrolled in middle school, (b) be receiving special education services under the category of intellectual disability or autism spectrum disorder, (c) be eligible for the state's alternate assessment, (d) be enrolled in at least one general education class, and (e) receive direct support from a paraprofessional who consented to participate in the study. Assessment records indicated all four students scored below the 1st percentile on standardized measures of intellectual functioning and adaptive behavior.

Destiny and Darrell. Destiny was a 12-year-old, European American female with intellectual disability and attention deficit disorder in the sixth grade. She used verbal speech to communicate. According to her teacher, Destiny enjoyed interacting with peers but had few opportunities to do so. Destiny was enrolled in four general education classes, including related arts (e.g., art, physical education, music), study hall, science, and social studies. Destiny's individualized education program (IEP) included goals targeting improved use of language and communication, working independently on class activities, basic math skills (e.g., counting money, solving simple word problems), and reading comprehension.

Darrell supported Destiny in science class. Darrell was an African American male with 14 years of experience as a paraprofessional, including 7 years of experience in his current position. At the time of the study, Darrell had not yet earned a college degree but was pursuing teacher certification in special education. Darrell also supported other students with disabilities in general education settings. Darrell was supervised by a European American, female special educator who had a master's degree, 29 years of experience as a teacher, and 13 years of experience in her current role.

Thomas and Renee. Thomas was a 14-year-old, European American male with intellectual disability, speech impairment, and hearing impairment in the eighth grade. He used

verbal speech to communicate. Based on baseline observations, Thomas enjoyed interacting with peers, but his conversations with peers were often repetitive and centered on his restricted interests. Thomas was enrolled in three general education classes, including science, social studies, and related arts (e.g., art, physical education, music). His IEP included goals targeting oral language and listening, functional math (e.g., counting money, telling time), fine motor skills, and pre-vocational skills (e.g., personal safety, following multiple-step directions).

Renee supported Thomas in science class. She was a European American female with 2 years of experience as a paraprofessional. Renee had earned a bachelor's degree in an unrelated field. Renee also supported other students with disabilities in general education and self-contained settings. Renee was supervised by a European American female special educator who had a master's degree and 12 years of experience in special education, including 8 years of experience in her current role.

Steven and Susan. Steven was a 12-year-old, European American male with intellectual disability in the sixth grade. He used a combination of verbal speech, gestures, and a speech-generating device to communicate. During the research study, Steven's speech-generating device was not available because it was sent to the manufacturer for repair. According to notes from baseline observations, Steven's verbal speech was difficult for some of his peers to understand, and he typically spoke only in two- to three-word utterances. Steven was enrolled in four general education classes, including reading, social studies, study hall, and related arts classes (e.g., art, physical education, music). Steven's IEP included goals targeting improved communication and speech, basic literacy, functional math (e.g., telling time, counting money), and increased independence with daily living skills.

Susan supported Steven in science class. Susan was a European American female with 8 years of experience as a paraprofessional, all at her current school. Susan's highest level of education was a high school diploma. Susan

also supported a number of other students with disabilities in general education settings. Susan was supervised by a European American female special educator who had a master's degree and 3 total years of experience in special education, all in her current role.

Olivia and Erin. Olivia was a 10-year-old African American female with autism spectrum disorder in the fifth grade. She used a combination of vocalizations, gestures, and a speech-generating device to communicate. According to baseline observations, her speech-generating device was present during observations but was almost always turned off and inaccessible to Olivia. Olivia's special educator reported that peers were sometimes apprehensive around Olivia because she was bigger than most of her classmates and sometimes engaged in vocal outbursts and stereotypic behavior (e.g., body rocking, hand-washing movements, repetitive touching of face). Olivia was enrolled in four general education classes, including math, science, reading, and physical education. Her IEP included goals targeting communication with her peers, improved communication of her needs and wants, functional literacy skills (e.g., recognizing signs), functional math skills (e.g., recognizing coins), and fine motor skills.

Erin supported Olivia throughout the school day. Erin was a European American female with 14 years of experience as a paraprofessional, including 2 years in her current position. Erin's highest level of education was an associate degree. Her primary responsibility was to support Olivia throughout the school day in a combination of inclusive and self-contained settings, although she did also support one other student with a severe disability during one class period. Erin was supervised by a European American female special educator who had a master's degree and 25 total years of experience in special education, including 7 years of experience in her current role.

Peers Without Disabilities

Teachers selected peers who (a) were already enrolled in the same class as the focal student,

(b) did not have a severe disability, (c) had a good record of attendance, (d) worked well with adults, and (e) had a history of positive interactions with the student with a disability. Eleven peers provided support to students with disabilities. Two sixth-grade peers supported Destiny, including one European American female and one European American male. The female peer sometimes worked with Destiny during small-group activities during baseline observation. Three eighth-grade peers supported Thomas, including two European American males and one European American female. One of the boys occasionally interacted with Thomas and helped him participate in small-group activities during baseline observation. Three sixth-grade peers supported Steven, including two European American females and one European American male. One of the girls had a younger sibling with autism spectrum disorder, and the other had approached the paraprofessional about helping Thomas with his academic work during baseline observation. Three fifth-grade peers supported Olivia, including two African American females and an Asian American female. Erin reported that all three peers had shown interest in interacting with Olivia and sat with her most days during lunch.

School and Classroom Settings

Destiny, Thomas, and Steven attended two different middle schools in a school district serving rural and suburban communities. One school served more than 800 students, approximately 90% of whom were European American, and about one sixth received free or reduced-price meals. The second school served more than 500 students, approximately 90% of whom were European American, and less than 10% received free or reduced-price meals. The fourth participant (Olivia) attended a middle school that served more than 700 students in a large, urban school district. Approximately half of the student body at this school was European American, and just over half received free or reduced-price lunch. All schools were located in the southeastern region of the United States.

Destiny attended a 50-min sixth-grade science class each morning. Based on baseline observations, 70.2% of observational intervals included large-group instruction, 9.4% included small-group instruction, and 43.8% included independent seatwork. (Each 10-min interval could include more than one instructional format.) Small-group instruction most often involved laboratory activities. Prior to intervention, Destiny was in close proximity to her peers for an average of 88.5% of the class period (range, 52.7%–100%). Destiny was the only student with a severe disability enrolled in the class.

Thomas attended a 50-min eighth-grade science class each afternoon. Most (75.0%) observational intervals included large-group instruction, 4.7% included small-group instruction, 4.8% included students working with partners, and 32.5% included independent seatwork. Prior to intervention, Thomas was in close proximity to peers without severe disabilities an average of 98.6% of the class period (range, 95.1%–100%). One other student with a severe disability was enrolled in the class, but he sat at a different table from Thomas.

Steven attended a 50-min sixth-grade science class each morning. Most (83.7%) observational intervals included large-group instruction, 17.3% included small-group instruction, 1.7% included students working with partners, and 44.3% included independent seatwork. Prior to intervention, Steven was in close proximity to peers for an average of 93.5% of the class period (range, 71.1%–100%). Susan (the paraprofessional) sat at one of the desks in the same cluster as Steven. Steven was the only student with a severe disability enrolled in the class.

Olivia attended a fifth-grade science and math block each afternoon. Although the entire block lasted about 90 min, Olivia rarely attended more than the first 45 min. Classwide instructional formats in this class included large-group (55.0% of 10-min intervals), small-group (16.3%), partners (4.9%), and independent seatwork (45.6%). Most students sat in rows of desks facing a blackboard and a projector screen. However, Olivia sat at a large table in the back

of the room with her paraprofessional (Erin). The table was oriented so Olivia would have to turn her body to the left to see the blackboard or projector screen. Prior to intervention, Olivia was in close proximity to peers for an average of 2.5% of the class period (range, 0.0%–16.0%), usually during transition times when Olivia stood in line with other students or when another student would come to the back of the room. Erin delivered one-to-one instruction for the bulk of the class period, with short breaks during which Olivia went for a walk, used the bathroom, or sat quietly by herself. Olivia was the only student with a severe disability enrolled in the class.

Experimental Design and Procedures

We used a multiple-probe-across-participants design, which involves repeated intermittent measurement of the dependent variable and staggered introduction of the independent variable across participants (Gast, 2010). The first author (referred to as "I" in the Method section) was responsible for implementation and supervision of procedures.

Baseline procedures. All participants began in a baseline phase in which students with severe disabilities received direct support from paraprofessionals. Paraprofessionals received no additional training from the special educator, and I directed them to provide support to students with severe disabilities just as they had prior to the study. The extent to which paraprofessionals attempted to facilitate interactions and shared work among the focus students and their classmates during the baseline phase was limited, as displayed in Table 1.

Preintervention procedures. I provided a 4.5-hr, one-to-one orientation session to each special educator who would subsequently train a paraprofessional. This training focused both on peer support implementation and professional development components. I provided an intervention manual detailing all steps associated with implementation of peer support arrangements, and I described and modeled each step. Similarly, I

provided a professional development implementation checklist, describing and modeling each training step. To ensure special educators were prepared to implement all components correctly, I required them to successfully implement all steps in a mock training while I played the role of paraprofessional. In addition, I directed the special educator to collaborate with the general educator and paraprofessional to identify peers who would provide support in the intervention phase.

Intervention. Once teachers were trained and peers recruited, special educators delivered an initial 2-hr training session to paraprofessionals. During this training session, the teachers (a) explained the rationale for peer support arrangements, (b) outlined implementation steps associated with peer support arrangements, and (c) explained and provided examples of specific strategies for how to facilitate peer interactions and academic support. The teacher conveyed the implementation steps in multiple ways, including verbal description, provision of an intervention manual, and showing video models of implementation steps (provided by the research team). In addition, the special educator led the paraprofessional in creating a peer support plan outlining potential roles for focal students, peers, and the paraprofessional during different instructional contexts or activities.

After the initial training session, paraprofessionals held an orientation meeting with the two or three peers identified during the baseline phase. During this orientation meeting, paraprofessionals introduced peer support arrangements and shared individualized strategies to provide support from the peer support plan (for more details, see Carter, Cushing, & Kennedy, 2009). During the next class meeting, paraprofessionals began to facilitate peer support arrangements using facilitative strategies (see Table 2).

Immediately after the orientation with peers, paraprofessionals viewed two researcher-created video models depicting an adult facilitating interactions and academic support between peers and a student. These video models were designed as a follow-up to the initial training session to provide a review and examples of facilitation behaviors. The first

Table 1. Percentages of Observation Intervals With Interactions, Academic Engagement, Proximity to Peers, and Paraprofessional Facilitation of Peer Support by Participant and Phases.

Measure	Destiny and Darrell		Thomas and Renee		Steven and Susan		Olivia and Erin	
	Baseline	Intervention	Baseline	Intervention	Baseline	Intervention	Baseline	Intervention
Total paraprofessional facilitation behaviors	0.0 (0.0–0.0)	2.0 (0.0–7.2)	0.9 (0.0–2.8)	2.0 (0.0–3.9)	1.4 (0.0–7.0)	3.4 (1.3–5.8)	0.1 (0.0–1.2)	5.7 (2.0–14.3)
Prompt social interactions	0.0 (0.0–0.0)	0.5 (0.0–3.0)	0.2 (0.0–0.6)	0.1 (0.0–0.6)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.1 (0.0–1.2)	0.4 (0.0–1.7)
Reinforce social interactions	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.6)	0.2 (0.0–1.8)	0.3 (0.0–1.2)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
Provide information for social interactions	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.1 (0.0–0.7)	0.2 (0.0–1.2)	0.0 (0.0–0.0)	0.1 (0.0–0.9)
Prompt academic support	0.0 (0.0–0.0)	0.9 (0.0–2.8)	0.5 (0.0–1.1)	1.0 (0.0–3)	0.3 (0.0–3.5)	1.5 (0.0–3.2)	0.0 (0.0–0.0)	1.9 (0.0–8.2)
Reinforce academic support	0.0 (0.0–0.0)	0.4 (0.0–2.8)	0.3 (0.0–1.7)	0.3 (0.0–1.2)	0.5 (0.0–2.1)	0.8 (0.0–1.9)	0.0 (0.0–0.0)	0.0 (0.0–2.0)
Provide information for academic support	0.0 (0.0–0.0)	0.2 (0.0–1.1)	0.0 (0.0–0.0)	0.4 (0.0–1.8)	0.2 (0.0–1.8)	0.4 (0.0–2.1)	0.0 (0.0–0.0)	1.4 (0.0–3.1)
Prompt proximity	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.5 (0.0–1.9)	0.0 (0.0–0.0)	0.1 (0.0–1.1)
Check-in with peers	0.0 (0.0–0.0)	0.1 (0.0–1.1)	0.0 (0.0–0.0)	0.2 (0.0–1.1)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	1.1 (0.0–2.7)
Total interactions with peers	5.1 (0.0–38.0)	16.4 (3.9–46.3)	7.9 (1.6–19.5)	25.4 (13.5–44.9)	3.1 (0.0–9.6)	7.2 (1.4–12.5)	0.0 (0.0–0.0)	23.8 (3.9–36.0)
Peer interactions toward focal student	4.9 (0.0–37.0)	15.7 (3.9–45.7)	6.6 (1.1–15.5)	23.4 (12.9–44.3)	2.7 (0.0–7.0)	5.7 (1.4–9.8)	0.0 (0.0–0.0)	23.8 (3.9–36.0)
Focal student interactions toward peer	2.8 (0.0–21.0)	6.7 (0.6–24.0)	6.4 (1.1–19)	16.3 (6.7–30.3)	1.7 (0.0–6.1)	5.2 (1.4–9.7)	0.0 (0.0–0.0)	1.5 (0.0–13.3)
Academic engagement	72.9 (52.7–90.9)	66.1 (41.8–81.1)	44.0 (1.1–79.8)	35.7 (13.5–68.1)	25.4 (7.0–52.2)	22.2 (1.2–39.9)	23.5 (4.3–61.4)	9.4 (0.0–25.5)
Proximity to peers	88.5 (52.7–100)	98.4 (86.7–100)	98.6 (95.1–100)	98.4 (94.7–100)	93.5 (71.1–100)	93.6 (76.4–100)	2.5 (0.0–16.0)	49.3 (27.5–100)

Note. Percentages reflect the average across all baseline or intervention observations sessions. Ranges are reported in percentages.

Table 2. Paraprofessional Behaviors, Definitions, and Examples.

Behavior	Definition	Example
Prompt social interaction	Paraprofessional encourages or suggests a way for the focal student to interact with a peer, or a peer with the focal student.	Paraprofessional points to a symbol on augmentative communication device to prompt the focal student to answer a question from a peer.
Reinforce social interaction	Paraprofessional praises the focal student or peer for social interactions (verbally or with gestures).	The paraprofessional gives the focal student a "thumbs-up" when he greets a peer.
Provide information for social interaction	Paraprofessional provides information to peers that might help peers to better interact with the student. This includes information about how the focal student communicates, interpreting the focal student's behavior, the focal student's interests, and possible conversation topics.	Paraprofessional says to peer, "When Dylan tries to stroke your hair, that is his way of trying to interact with you. Just let him know that you don't like it, but you would love to give him a fist bump and talk with him."
Prompt academic support	Paraprofessional encourages or suggests a way for peers to work with the focal student to help him/her participate in class.	Paraprofessional says to peer, "Maybe after the lecture, you could explain to Sarah in a few sentences what it was about."
Reinforce academic support	Paraprofessional praises the peers for the way they are working with the focal student to help him or her participate in class.	Paraprofessionals says to peer, "That was really smart to think of helping Marty outline his paper so he could go back and fill in the information."
Provide information for academic support	Paraprofessional provides information to peers so that they might better support the student. This includes information about strengths and needs related to class participation, accommodations and modifications, and instructional strategies.	Paraprofessionals says to peer, "Olivia has a really hard time writing. Maybe she could tell you the answer and you could write it down."
Prompt proximity	Paraprofessional prompts the focal student and peers to be in close proximity (verbally or with gestures).	Paraprofessional asks the focal student to sit by a peer so they can partner for an activity.
Check-in with peers	Paraprofessional communicates with peers to see if they are comfortable in their role providing support, if there is anything they want to talk about or discuss, or if there would like assistance from the paraprofessional.	Paraprofessional says to peer, "You look frustrated. Is there something I can do to help?"

video focused on facilitating social interactions, and the second video focused on facilitating academic support among students. These videos featured graduate students demonstrating the behaviors with middle and high school students with and without disabilities in simulated settings.

At least 1 week after the paraprofessional had begun implementation of the peer support arrangement, special educators delivered a

1-hr follow-up coaching session to paraprofessionals. First, teachers either conducted a live observation in the classroom or watched a video recording of the paraprofessional and students in the classroom. Two teachers chose to conduct live observations, and the other two chose to watch video recordings. Paraprofessionals collected video recordings by setting up a video recorder on a tripod or stable surface so that the focal student, peers, and paraprofessional were all visible in the frame. Observations were at least 30 min in length. After observing, teachers met with paraprofessionals to reinforce examples of excellent implementation, provide feedback about how to take advantage of missed opportunities for facilitation, and discuss steps that could be taken to improve facilitation of peer support.

Self-monitoring. Only Darrell used a self-monitoring system. Because Darrell's facilitation of peer support was inconsistent after receiving the complete training package, I asked Darrell to complete a self-monitoring checklist each day. I gave Darrell a folder with enough checklists for the rest of the study and a vibrating timer set to 15 min. Every 15 min, Darrell recorded whether he had engaged in any facilitation.

Teacher procedural fidelity. I used a 41-step implementation checklist (available from the corresponding author upon request) to measure the degree to which each supervising teacher implemented professional development with fidelity. Implementation fidelity of the training package was calculated as the number of steps implemented correctly (prior to receiving corrective feedback) divided by the total number of steps. Fidelity was high (95.1%–100%) across teachers. I provided corrective feedback immediately after all implementation errors so all paraprofessionals would receive the complete professional development package as designed.

Dependent Measures and Recording

Orientation meeting with peers. I used a 10-step implementation checklist (available from the corresponding author upon request) to measure the degree to which paraprofessionals implemented the initial orientation meeting with peers with fidelity. Implementation fidelity of the orientation meeting was calculated as the number of steps implemented correctly divided by the total number of steps.

Classroom observations. Two to five times each week, an observer collected data in the general education classroom. Observers collected data from the moment the student entered the classroom (often during a passing period) until the moment the student left the classroom. The data collector observed the paraprofessional and student with severe disabilities for 10 s and then took 10 s to record whether behaviors of interest occurred in the previous observation interval. Behaviors of interest included whether (a) the focal student was in proximity to peers, (b) the paraprofessional used peer support facilitation strategies, (c) the focal student interacted with a peer, (d) a peer interacted with the focal student, and (e) the focal student was engaged in academic activities consistent with the rest of the class. All measures were converted to the percentage of intervals in which a behavior occurred.

Overall paraprofessional facilitation was defined as paraprofessionals' demonstration of any of the behaviors described in Table 2. *Interactions* were defined as the focal student's direction of verbal or nonverbal (e.g., gestures, signs, or use of a speech-generating device) communicative behaviors toward the peer or of such behaviors by the peer toward the focal student. *Consistent academic engagement* was defined as the focal student's looking at instructional materials, looking at the teacher, writing, following teacher instructions, raising his or her hand, or asking questions related to instructional activities that were consistent or aligned with the content provided to the majority of the class (i.e., identical or modified from the general education class curriculum). *Proximity to peers* was defined as the focal student's sitting or standing beside or across from a peer without severe disabilities with no more than 1 m separating the focal student and the peer.

Observer Training and Reliability

Observers included five graduate students studying special education. In two 2-hr training sessions, I reviewed the training manual with observers and provided verbal, written, and video examples and nonexamples of all codes. Observers did not collect primary intervention data until they met the following criteria: 100% accuracy on a written test of coding definitions, at least 90% accuracy on all variables when coding three 10-min video recordings, and at least 90% agreement with an expert coder on all variables in a live setting. A second observer collected data on 33.7% of classroom observations, balanced across study participants and experimental conditions. Agreement was calculated by dividing the number of intervals the primary and secondary observer codes matched by the total number of intervals (Gast, 2010). Agreement ranged from 91.8% to 100% across all variables.

Social Validity

After the experiment was over, I asked each teacher and paraprofessional to complete a questionnaire about the acceptability and feasibility of the training package. Surveys asked teachers and paraprofessionals to characterize (a) how they viewed the acceptability and feasibility of the training package, (b) how they viewed the acceptability and feasibility of peer support arrangements, (c) the likelihood teachers might offer and paraprofessionals might participate in similar training in the future, and (d) the likelihood teachers and paraprofessionals would implement peer support arrangements in the future.

Results

Paraprofessional Implementation of Initial Meeting With Peers

After receiving initial training, Erin and Susan independently implemented eight of the 10 steps correctly (80%), and Darrell and Renee independently implemented all 10 steps correctly (100%). All errors involved completely skipping an implementation step; in no case did paraprofessionals attempt to implement a step but do so incorrectly. I provided corrective feedback immediately after all implementation errors so that all peers would experience the initial orientation meeting as designed.

Paraprofessional Facilitation of Peer Support Arrangements

Changes in the occurrence of paraprofessional facilitation behaviors during class between baseline and intervention phases varied across participants (see Figure 1). For two paraprofessionals (Darrell and Erin), clear differences in level were evident through visual analysis. For Renee, a change in level was less clear, but data were more variable in the intervention phase. For Susan, changes in level and variability were tempered by variability in the baseline phase. Frequency of facilitative behavior maintained but did not sharply increase after teachers delivered performance feedback in a coaching session. Across all paraprofessionals, academic facilitation behavior was more frequent than social (see Table 2). Percentage of nonoverlapping data (PND; Scruggs & Mastropieri, 1998) was calculated to aid in objective analysis of changes in level. Although useful as an objective tool for analyzing consistency of changes in level, results from PND should not be interpreted as effect sizes (Wolery, Busick, Reichow, & Barton, 2010; but see Scruggs & Mastropieri, 2013, for another view).

Darrell did not demonstrate any facilitation behaviors during the baseline phase. After he received initial training and access to the video models, the frequency of Darrell's facilitative behavior increased in level (PND = 86.7%) and variability. After an initial increase, data trended downward to baseline levels, increased again, and remained flat with self-monitoring. Most (74.4%) facilitative behavior was related to academic support (i.e., prompting, reinforcing, or providing information for academic support). The frequency of Darrell's facilitative behavior was greatest in class sessions immediately following initial training. Neither the coaching
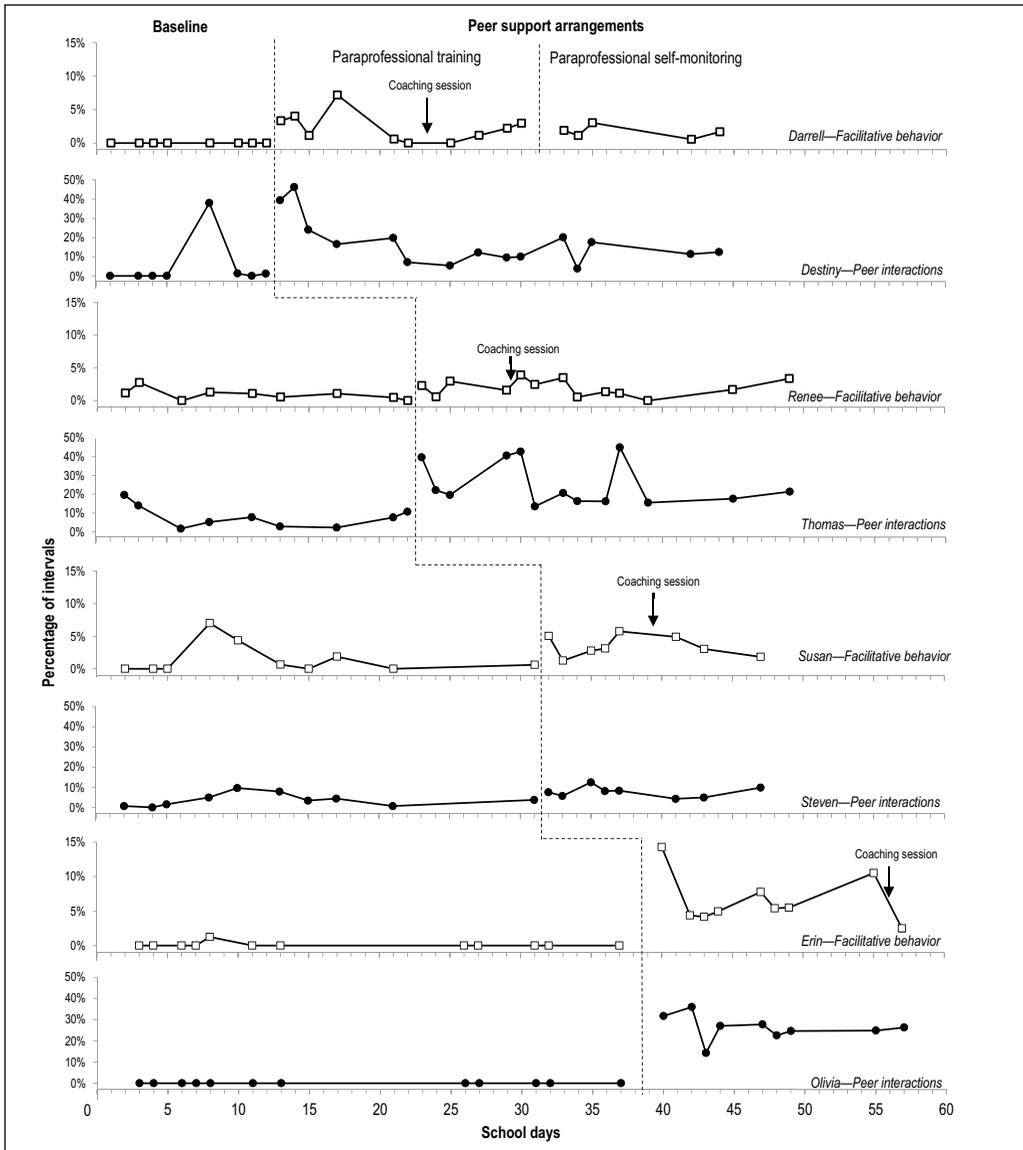
Figure 1. Paraprofessional behaviors facilitating peer support (open squares) and interactions between students with disabilities and their peers (filled circles).

session nor introduction of a self-monitoring system resulted in a clear change in facilitative behavior, although behavior was less variable with the self-monitoring system.

The level of Renee's facilitative behavior during the baseline phase was relatively flat. After she received initial training and access to video models, the variability of Renee's behavior increased, but there was not a clear and consistent change in level (PND = 23.1%).

The coaching session did not result in a clear change in behavior. Most (86.8%) facilitative behavior was related to academic support.

Susan's facilitative behavior was highly variable during the baseline phase. Data points in the intervention phase differ in level from the final five points of the baseline phase. However, variability earlier in the baseline phase tempers this change. When all baseline data points are included in PND analysis, there

is complete overlap between phases (0% PND). When the first half of the baseline phase is excluded, conditional analysis indicates a more consistent change in level (PND = 75%). The coaching session did not result in a clear change in behavior. Most (81.3%) facilitative behavior was related to academic support.

Erin demonstrated only one facilitative behavior during the entire baseline phase. After she received initial training and access to the video models, there was a clear and substantial increase in level. Intervention data were highly variable without a clear upward or downward trend. Facilitative behavior was most frequent immediately after initial training, and the coaching session did not result in a clear change in behavior. Most (75.2%) facilitative behavior was related to academic support.

Student Outcomes

Peer interactions. For two students (Thomas and Olivia), paraprofessional implementation of peer support arrangements coincided with a clear improvement of peer interactions. Although a single outlier in Destiny's baseline data led to overlap, a change in data patterns between phases is evident. Steven did not experience a clear change in peer interactions between phases. Peer interaction data are displayed in Figure 1, and descriptive statistics for total interactions, interactions from the focal student toward peers, and those from the peers toward the focal student are included in Table 1.

The level of Destiny's peer interactions was flat during baseline with the exception of 1 day when the class completed lab work in partners. When all baseline data are included, PND calculations show a high degree of overlap between phases (PND = 13.1%). When the outlier is removed from the data, conditional analysis indicates a much more consistent change in level (PND = 100%). The trend of the data sharply increased with the introduction of the intervention, decreased, and then remained mostly flat.

The level of Thomas's interactions with peers during the baseline phase was flat but somewhat variable. His peer interactions increased immediately after introduction of the peer support arrangement, although variability in both phases limits the degree to which phases do not overlap (PND = 53.8%). Although highly variable, there was no clear upward or downward trend in the intervention data. This variability might be related to a rotation of three peers partnering with Thomas during class activities.

Steven's interactions with peers were somewhat variable during the baseline phase. There were no clear differences in level, trend, or variability between phases.

Olivia was never observed interacting with her classmates during the baseline phase. However, she was rarely in close proximity to her classmates in the baseline phase (M = 2.5% of intervals, range = 0.0%–16.0%). Immediately after the introduction of peer supports, the level of Olivia's interactions with peers increased substantially and consistently (PND = 100%).

Consistent academic engagement. Across all four participants, the percentage of intervals with consistent academic engagement was variable across both baseline and intervention phases (see Figure 2). Engagement tended to be highest during initial baseline observations, perhaps due to paraprofessionals' or students' reaction to the presence of observers before reverting to more typical patterns of behavior (i.e., Hawthorne effect; Gast, 2010).

Social Validity

Professional development package. All four teachers perceived the training package to be much more effective than the methods they usually used to train paraprofessionals. Two teachers indicated it was "not at all difficult" and two indicated it was "a little difficult" to find time to implement the training package. Teachers indicated that if asked by an administrator, one would be "quite likely" and three would be "extremely likely" to recommend the training package for districtwide training. Two teachers indicated they would be "quite likely" and two "extremely likely" to use similar training
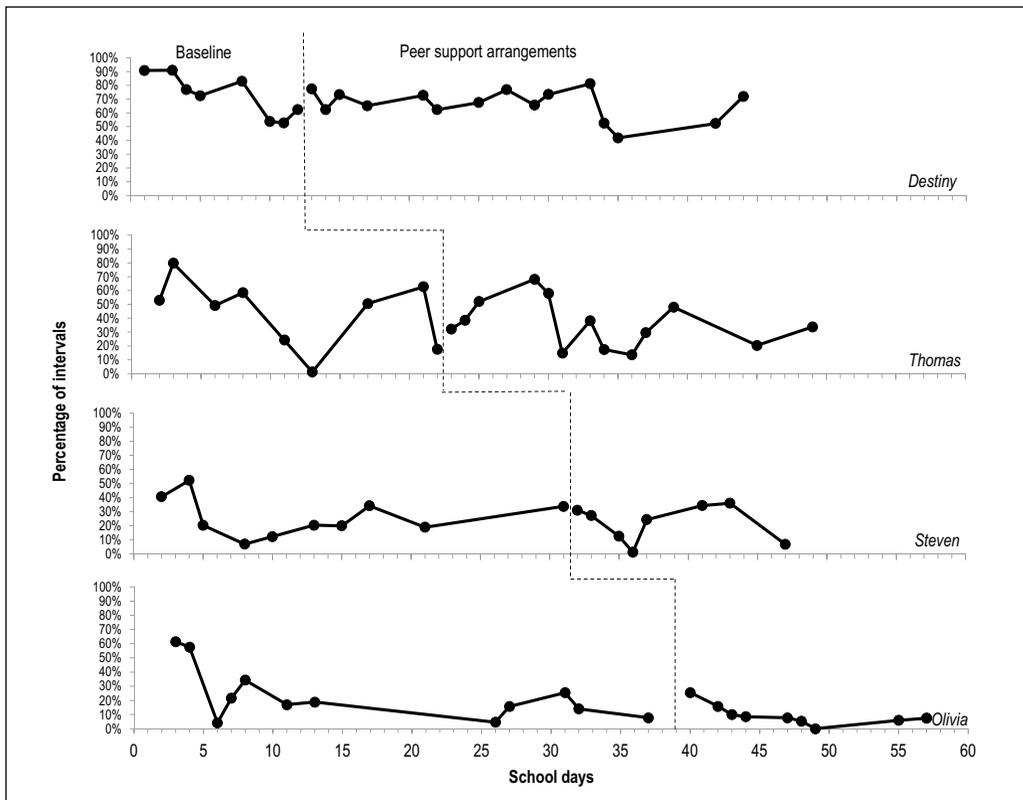
Figure 2. Academic engagement of students with disabilities.

strategies with paraprofessionals in the future. When asked what might be changed about the training package, one teacher suggested including general educators in the training process, and another suggested equipping paraprofessionals with a simple checklist to track student outcomes (e.g., peer interactions).

Paraprofessionals perceived the training package to be somewhat more effective or much more effective than the training they typically receive. Three paraprofessionals indicated it was "not at all difficult" to find time to complete the training, and one indicated it was "somewhat difficult." All paraprofessionals indicated that if asked for input from an administrator, they would be "extremely likely" to recommend the training package for district-wide training. Two indicated they would be "quite likely" and two indicated they would be "extremely likely" to participate in future professional development opportunities involving same training model. When asked what might

be changed about the training package, one paraprofessional suggested having the special educator collaborate with the general educator.

Peer support arrangements. Two teachers perceived peer support arrangements to be quite effective, and two as very effective, at improving outcomes for students with severe disabilities. Three teachers indicated they would be "extremely likely" and one would be "very likely" to encourage paraprofessionals to continue implementation of peer support arrangements after the conclusion of the research study. Three teachers reported they would be "extremely likely" and one would be "quite likely" to support other paraprofessionals in implementing peer support arrangements. Two teachers reported they were "quite likely" and two were "extremely likely" to recommend peer support arrangements to other teachers. When asked what advice they had for other teachers working with paraprofessionals to implement

peer support arrangements for the first time, one teacher recommended "being patient because the process does work when all the steps are followed accordingly." Another teacher wrote, "Look for low hanging fruit—quick and easy times and places to turn over what a paraprofessional does to a peer. Give up a little control and don't worry about if it isn't perfect." Other teachers wrote, "Communication [with the paraprofessional] is key" and to "take it little by little and be very encouraging."

All paraprofessionals perceived peer support arrangements to be extremely effective at improving outcomes for students with severe disabilities. All four also indicated it was "not at all difficult" to implement peer support arrangements. Two paraprofessionals indicated they were "quite likely" and two were "very likely" to continue implementing peer support arrangements after the conclusion of the research project and to recommend peer support arrangements to other paraprofessionals. When asked for examples of why peer support arrangements were successful, Darrell wrote, "Destiny was shy at the beginning of the school year. She now is more active in class and talks non-stop. Her shy shell is broken." Renee wrote, "Thomas is much more involved when working with his peer group instead of working with me." Susan wrote, "Before I even get to the classroom, the peers are already helping Steven get started on his classwork." Erin wrote, "Olivia's peers really enjoy working with her, and I think it shows the [classroom] teacher a little more of what she is capable of." When asked about the most challenging aspect of implementing peer support arrangements, one paraprofessional wrote, "Making sure the peers got their own work done." Another paraprofessional wrote it was sometimes necessary to "remind peers not to do the work for the student." Another paraprofessional wrote, "Nothing was challenging for implementing peer supports for this student, but I think it would be tough to do with a student who has behavior problems." The fourth paraprofessional indicated nothing had been challenging about implementing the peer support arrangement.

Discussion

Although peer support arrangements are a recommended strategy for improving social outcomes in general education classrooms, previous research has not provided a model for how paraprofessionals might implement this strategy under typical circumstances. This study investigated whether teacher-delivered professional development would enable paraprofessionals to implement peer support arrangements with fidelity and whether implementation of peer support arrangements would result in improved outcomes for students with severe disabilities. Findings showed special educators delivered professional development accurately, paraprofessionals implemented peer support arrangements with fidelity, and outcomes improved for three of the four students with severe disabilities. These findings extend the literature regarding teacher-delivered professional development, paraprofessional roles in the inclusive classroom, and the benefits of peer support arrangements for students with severe disabilities.

Given relatively brief training, special educators can accurately and effectively administer professional development strategies that enable paraprofessionals to implement peer support arrangements.

First, this study shows that given relatively brief training, special educators can accurately and effectively administer professional development strategies that enable paraprofessionals to implement peer support arrangements. Despite the expectation that special educators train and supervise paraprofessionals (Council for Exceptional Children [CEC], 2011), this is the first published study that involved teachers who successfully trained paraprofessionals to implement an intervention with students who have severe disabilities (for a recent systematic review, see Brock & Carter, 2013b). Further, teachers perceived the professional development they delivered to be both effective and feasible.

Second, findings from this study show that given brief professional development featuring promising training strategies, paraprofessionals implemented peer support arrangements with fidelity by developing a peer support plan, orienting peers to their new roles, and supporting the arrangement with facilitation strategies. Previous studies of peer support arrangements have not included paraprofessionals as primary intervention agents, nor have they all included strong measures of implementation fidelity. Therefore, benchmarks for optimal rates of facilitative behavior are unclear. Identifying such benchmarks is complicated by factors that might affect the amount of facilitation needed, including the complexity of a student's support needs, the nature of an instructional activity, and the degree to which peers independently initiate appropriate interactions and academic support. Our findings suggest that after development of a peer support plan and orientation of peers to their roles, low but consistent rates of facilitative behavior may be sufficient to improve student outcomes. This seems reasonable when considering that a single paraprofessional prompt or check-in might be sufficient to prompt sustained interactions and shared work. However, we found relatively infrequent rates of some specific facilitation behaviors to be concerning and anticipate paraprofessionals might benefit from more explicit training to elevate these rates. For example, paraprofessionals tended to prompt students to interact and work together much more often than they reinforced them. This is especially surprising given the length of time that peer support arrangements were in place. One might have expected the ratio of prompting to reinforcement to change as peers began providing support with less prompting, but instead, rates of reinforcement were consistently low, and overall rates of facilitative behavior tended to decline over time. In addition, paraprofessionals seldom focused on facilitation of social interactions. Even though one might have expected a greater emphasis on facilitation of academic support compared to social interactions, explicit promotion of social interactions was strikingly infrequent.

It is surprising that introduction of self-monitoring and performance feedback—two training strategies that have produced powerful effects in other professional development studies (e.g., Brock & Carter, 2013a; Sutherland & Wehby, 2001)—did not result in discernable increases in paraprofessional facilitation of peer support. The lack of increase in facilitation behaviors after the introduction of these strategies in the present study may be due to a combination of factors. For example, the efficacy of performance feedback might depend on who is providing it. In both the studies by Brock and Carter (2013a) and Sutherland and Wehby (2001), performance feedback was delivered by members of a research team who might be more skilled at delivering feedback or who might deliver feedback that is more tightly aligned with improvement of the dependent variable. Although all teachers did provide feedback that included at least one suggestion for improving specific facilitation behaviors, they also provided general feedback that (although possibly beneficial) did not directly relate to the behaviors measured in this study. In addition, researchers in prior studies delivered feedback based on formal measurement of the dependent variable. Teachers in the present study delivered feedback based on their own observations, during which they were directed to look for positive and negative examples of paraprofessional facilitation. It is also possible that paraprofessionals might respond differently to feedback based on their relationship with the person providing it. Wehby, Maggin, Partin, and Robertson (2011) found higher-quality relationships between professional development coaches and teachers were associated with increased quality of practitioner implementation. Because of the limited research, it is unclear if relationships between supervising teachers and paraprofessionals tend to be optimal for coaching. These relationships are often multifaceted, with teachers taking on a variety of roles, including supervising, evaluating, and working alongside paraprofessionals. The nature of these relationships might make it difficult for teachers to deliver constructive feedback. Alternatively, it is possible that this performance feedback or self-monitoring actually enabled paraprofessionals in this study to maintain implementation behaviors

and that implementation behaviors might have decreased or become more variable without it.

Third, findings from this study show peer support arrangements implemented by paraprofessionals can improve outcomes for students with severe disabilities. Although introduction of peer support arrangements resulted in increased interactions with classmates for three of the four participants with severe disabilities, these increases were smaller when compared to previous studies that tested the efficacy of peer support arrangements and used similar strategies to measure percentage of intervals with interactions (i.e., Carter et al., 2007, 2011). There are a number of plausible explanations for this large difference in magnitude of effects. For example, in both previous studies (i.e., Carter et al., 2007, 2011), members of the research team facilitated the arrangement and might have been more experienced and skilled than the paraprofessionals in the present study. It is also possible that contextual factors might explain these differences. For example, the majority of student in the two prior studies attended elective courses (e.g., ceramics, culinary), whereas students in this study attended core academic courses (i.e., science). Another contextual factor is focal student proximity to peers in the baseline phase. In the present study, Olivia—the only student who was rarely in proximity to peers during the baseline phase—experienced the largest increase in interactions in the peer support condition. Similarly, the participants in Carter et al. (2011)—who across participants were in proximity to peers for about half of intervals in the baseline phase—experienced larger increases in interactions than the three students in this study, who across participants were in proximity to peers for 93.5% of intervals. These findings, although descriptive, suggest that although proximity may play a role in the magnitude of effects, peer support arrangements are still effective when proximity to peers is held constant across phases.

Implications for Practice

Findings from this study have implications for special educators and teacher educators. Special educators must provide focused training to paraprofessionals on supporting students in general education classrooms. However, we emphasize that peer support arrangements should be supplemental to primary instruction and closely supervised by highly qualified teachers. It is inappropriate for students with severe disabilities to receive the bulk of their instruction from paraprofessionals as classmates learn primarily from a general educator. Prior to focused training, paraprofessionals in this study rarely or inconsistently encouraged students with severe disabilities and their peers without disabilities to interact or work together. Further, simply seating students with severe disabilities next to students without disabilities—without intentional planning and adult facilitation—was not sufficient to ensure that students interacted on a regular basis. Given that desired outcomes of inclusion for students with severe disabilities include increased opportunities for communication (Downing, 2005), improvement of social skills (Walton & Ingersoll, 2013), and development of friendships and social networks (Carter, Bottema-Beutel, & Brock, 2014), rare or infrequent peer interaction is not compatible with successful inclusion. Special educators should ensure higher rates of interaction through implementation of strategies such as peer support arrangements.

Teacher educators must ensure their special education preparation programs emphasize effective training and supervision of paraprofessionals. Special educators have reported that their preservice training does not prepare them for this responsibility (French, 2001). Effective strategies for training, managing, and supporting paraprofessionals should be an integral part of teacher preparation (CEC, 2011). Preservice training curricula should align with research literature that shows paraprofessionals can contribute to improved outcomes for students with severe disabilities when provided professional development that is sustained beyond an initial training session, includes effective training strategies (e.g., modeling and performance feedback), and holds paraprofessionals accountable for targeted implementation behaviors (Brock & Carter, 2013b).

Limitations and Directions for Future Research

Limitations to this study suggest avenues for future research. First, results in this study were not consistent across all four paraprofessionals and students. In future studies, researchers might explore which factors account for differential outcomes and investigate whether more intensive or more individualized training procedures result in more consistent improvements. Second, teachers and paraprofessionals included in this study represent volunteers from a larger pool of potential participants, and it is possible they might be more motivated to work together to implement peer support arrangements than practitioners who opted not to participate. In future studies, researchers might consider techniques to sample larger and more representative samples of teachers and paraprofessionals. Third, this study focused on individual teachers training one paraprofessional who supported a single student. In future studies, researchers might explore whether teachers could feasibly train and support larger numbers of paraprofessionals who work with multiple students. Fourth, general educators were not involved in the initial training provided by special educators to paraprofessionals. Future studies should explore how classroom teachers might be more fully engaged in the planning, implementation, and evaluation of peer support interventions.

Given the potential for well-trained and supported paraprofessionals to positively impact outcomes for students with severe disabilities, effective paraprofessional training and support should be a higher priority in both teacher preparation programs and in public schools.

Conclusion

Findings from this study show that special educators can deliver training and support to paraprofessionals that enables them to implement peer support arrangements for students with severe disabilities. However, scaling up high-quality teacher-delivered professional development for paraprofessionals would likely require systemic changes. Given the potential for well-trained and supported paraprofessionals to positively influence outcomes for students with severe disabilities, effective paraprofessional training and support should be a higher priority in both teacher preparation programs and in public schools.

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Authors' Note