Exploring Feasibility and Fit: Peer-Mediated Interventions for High School Students with Autism Spectrum Disorders

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Abstract

Although peer-mediated interventions can provide effective pathways for enhancing the social outcomes of students with autism spectrum disorders (ASD), their application within secondary schools has been fairly limited. In this exploratory study, we examined the implementation of peer support arrangements and peer networks for 102 adolescents with ASD attending 15 public high schools. Our focus was on the characteristics of students selected to receive these two interventions, the fidelity with which each was implemented, and the views of participating educators on the social validity of both. Educators involved a wide range of students with ASD in these interventions, delivered each with varied levels of fidelity, and considered both approaches to be acceptable and feasible. We highlight some of the complexities associated with delivering these social-focused interventions in high school settings and offer recommendations for future research and practice.

Keywords: inclusion, social relationships, high school, peer-mediated interventions

Exploring Feasibility and Fit: Peer-Mediated Interventions for High School Students with Autism Spectrum Disorders

Enhancing the social lives of students with autism spectrum disorders (ASD) has been a longstanding focus of both research and practice (Gaylord-Ross, Haring, Breen, & Pitts-Conway, 1984; Watkins et al., 2015). The importance of this investment becomes especially apparent when considering the power of peer relationships in the lives of adolescents. Through their interactions with others within and beyond the classroom, students can learn an array of critical skills (e.g., social, communication, academic, self-determination, and other life skills), access practical and emotional supports, develop an understanding of themselves and their world, and experience a sense of companionship and belonging that enhances their well-being (Powers et al., 2015). Accessing these interactions and relationships can be challenging for many adolescents with ASD, especially during high school (Carter, Common, et al., 2014). A combination of factors—such as the social-related challenges of students, the attitudes and expectations of peers, the support models used by school staff, and the paucity of inclusive practices within secondary schools—can coalesce to limit the opportunities students have to develop satisfying peer relationships (Carter, in press; Carter, Bottema-Beutel, & Brock, 2014).

Peer-mediated interventions are advocated as effective approaches for fostering social connections by introducing ongoing, supported opportunities for students with and without ASD to spend time together within or beyond the classroom (Huber & Carter, in press; Wong et al., 2014). A variety of peer-mediated interventions have been developed (e.g., peer tutoring, peer partner programs, cooperative learning) and two are the focus of this study—peer support arrangements and peer networks. *Peer support arrangements* involve one or more peers in providing ongoing and individualized support to a classmate with ASD within inclusive general education classrooms (Carter, Cushing, & Kennedy, 2009). These peers receive guidance and

feedback from school staff (e.g., special educators, general educators, paraprofessionals) on how best to support their classmate socially and academically across class activities (e.g., small-group projects, whole-group discussions, lectures, non-instructional activities). As students gain experience and confidence working with one another as classmates, the involvement of school staff is gradually faded to a background role. *Peer networks* involve establishing a cohesive social group of 3-6 peers around a student with ASD that meets formally and informally outside of the classroom and throughout the semester (Carter et al., 2013; Haring & Breen, 1992). The network formally meets regularly (e.g., weekly, biweekly)—during lunch, as part of an extracurricular club, or during some other non-instructional time—to participate in an enjoyable activity and interact socially. The group is launched and facilitated by school staff (e.g., general educator, school counselor, special educator) who shift to a background role as the network solidifies over time. Students also arrange time to connect informally before or after school, during breaks between classes, or as part of other school-sponsored activities. Both interventions are designed to introduce sustained and supported opportunities for students with ASD to meet, work alongside, and develop new relationships with peers at their school.

Applications of these two intervention approaches to high school students with ASD have been somewhat limited to date. Prior studies have either employed single-case designs with application to small numbers of participants with ASD (2-4 students; Carter et al., 2017; Gardner et al., 2014; Hochman, Carter, Bottema-Beutel, Harvey, & Gustafson, 2015; Huber, Carter, Shaw, & Stankiewicz, in press; Sreckovic, Hume, & Able, 2017) or group designs involving mixed samples of students with severe disabilities who sometimes had ASD (6-51 students; Asmus et al., 2016, 2017; Carter et al., 2016). Little is known about the considerations and complexities that arise when introducing these interventions into high school contexts and across a broad range of students who have ASD.

Additional research is needed in at least three areas. First, it is important to understand the range of students who might benefit from peer support arrangements and peer networks. Although adolescents with ASD share a common educational label, they comprise a heterogeneous group of students reflecting a diversity of strengths, needs, and educational pathways (Carter, Brock, & Trainer, 2014; Volkmer, Reichow, & McPartland, 2014). As educators consider the goals and guidelines of these two interventions against what they know about the individualized needs of the students they serve, much can be learned from observing which interventions they allocate to which students. Second, it is important to understand how local educators actually implement these interventions with their students. Educational efficacy studies often involve research teams extensively in the design and delivery of interventions, raising questions about what it would look like for local teachers to carry out these interventions under ordinary conditions in their own schools. Peer support arrangements and peer networks include multiple components that can be applied flexibly based on the needs of participating students (Huber & Carter, in press). Examining the ways in which educators implement these two peer-mediated interventions apart from extensive external support could provide new insights into how practical and adaptable these approaches are within high school contexts. Third, it is important to understand how these educators view the acceptability, feasibility, and fit of these interventions for high school students with ASD. A key contributor to the research-to-practice gap may relate to the social validity of interventions advocated in the literature (Carter & Pesko, 2008; Snell, 2003). As reflected in a recent review by Callahan et al. (in press), relatively few intervention studies include strong indicators of social validation. Asking educators about their experiences implementing these two interventions could shed light on the extent to which they work well within high school settings.

The purpose of this study was to examine the implementation and acceptability of two

peer-mediated interventions—peer support arrangements and peer networks—for a large sample of high school students with autism spectrum disorder. Our research questions were: What are the characteristics of students with ASD who educators selected to participate in these two peer-mediated interventions? To what extent were the interventions implemented with fidelity by school staff? How do these educators assess the social validity of these intervention approaches within the high school context? To answer these questions, we drew upon data collected during the first cohort of a multi-site randomized evaluation of a comprehensive intervention package carried out by the Center on Secondary Education for Students with Autism Spectrum Disorders (CSESA). We draw upon these findings to highlight some of the considerations and complexities associated with delivering these social-focused interventions in high school settings. We emphasize that our goal in the present paper was *not* to examine intervention efficacy. This question will best be addressed at the conclusion of the multi-year randomized trial.

Method

Participants

Participants were 150 students with ASD randomly assigned to participate in the intervention group during the first year of the CSESA evaluation project. The majority was male (84.7%) and White (72.0%); their average age was 15.8 (*SD* = 1.3). Among all participants, 102 students received one or more peer-mediated interventions (i.e., peer support arrangements, peer networks, both); the remaining 48 received other aspects of the CSESA intervention package without these peer-mediated components. Table 1 displays participant characteristics and diagnostic information by the types of interventions received.

To participate in the overarching project, students must have (a) received special education services under the Individuals with Disabilities Education Act, (b) had an Individualized Education Plan (IEP), (c) had a primary or secondary label of autism on their IEP,

and (d) been at least two years away from graduation (i.e., no seniors). After we obtained Institutional Review Board (IRB) and district approvals, school staff sent home study invitations and permission forms for all students meeting these inclusion criteria at a participating school. If 12 or fewer packets were returned by the project deadline, then all students were enrolled in the study. If more than 12 consent packets were returned by the project deadline, we randomly selected students stratified by diploma type (i.e., standard diploma, modified diploma).

Schools

The multi-year study involved 60 high schools in three states. After recruiting school districts, we worked with district staff to identify high schools with (a) at least 8 students meeting inclusion criteria, and (b) a willingness to participate, as evidenced by at least three school staff (including an administrator) signing a study memorandum of understanding. Once high schools were recruited, we blocked schools by district (or similar districts if the numbers were uneven) and randomly assigned each block to receive the CSESA package (intervention group) or to carry out their services-as-usual (comparison group). High schools participated for two years and entered the study in two staggered cohorts. The present study focuses on students with ASD at intervention high schools (n = 15) from year one only.

All 15 schools were public high schools serving a wide range of students with ASD. These schools ranged in size from 900 to 3,079 students (M = 1,849 students). Six were in urban areas (cities), seven were in suburban areas, and two were in rural areas. The proportion of white, non-Hispanic students ranged from 12% to 93% (M = 57.9%). The mean proportion of students receiving free and reduced-priced meals was 34.6% (range, 7.0% to 75.0%). The two peer-mediated interventions took place in a wide range of classrooms and other schools settings.

Intervention Model and Implementation

The CSESA model is a comprehensive intervention package designed for public high

schools serving students with ASD (Odom, Duda, Kucharczyk, Cox, & Stable, 2014). At each school, the model involves a five-step process addressing professional development, assessment, planning, intervention, and evaluation. Students with ASD attending the school are provided a combination of up to eleven research-based interventions (i.e., alternative achievement literacy instruction; Collaborative Strategic Reading-High School; Social Competence Intervention-High School; peer support arrangements; peer networks; Personal Responsibility, Independence and Self-Management; student involvement in the IEP; work-based learning; Transitioning Together; community/school resource mapping; transition planning) spanning four domains: academics, independence and behavior, peer and social competence, or transition and family. The combination and sequencing of these interventions is individually determined for each student by those school staff who comprise a newly formed Autism Team at every school. Each school also has access to at least one project coach who provides training and support to team members on the implementation of the overall model and its individual interventions. The CSESA model incorporates implementation science principles and so individual interventions are rolled out over the course of the two-year study based on input from the Autism Team, individual student needs, and logistical considerations (e.g., student schedules, staff availability). Although participating students could receive any combination of interventions, we anticipated every student would receive at least one intervention in each of the four domains. Peer support arrangements and peer networks represented two of the three interventions comprising the social competence domain.

Peer support arrangements. Peer support arrangements involved inviting 1-2 classmates without disabilities (called “peer partners”) to support a participating student with ASD in one general education class. Peer partners sat in close proximity to the focus student and provided social (e.g., initiating conversations, modeling appropriate social skills, making

introductions to other classmates, conversing about school and other activities) and/or academic (e.g., encouraging contributions to class and group discussion, highlighting key concepts, sharing materials, providing feedback) support in the spirit of a classmate, rather than a tutor. The students were supported by a member of the school staff (e.g., special educator, general educator, paraprofessional) who adopted a facilitation role within the classroom—providing any initial training, assistance, feedback, and encouragement the students needed as they worked together. A written peer support plan was typically developed for the classroom, which outlined basic ideas for the participation of the focus student, their peer partners, and the facilitator during each segment of a typical class period (e.g., beginning of class, lecture, small-group work, independent seatwork, end of class). After selecting and inviting peer partners, the facilitator often reviewed the written plan with students (with or without the focus student present) during an initial orientation meeting. Although students need not have worked together constantly throughout each class period, the expectation was that the peer support arrangement would last throughout the semester. These procedures were adapted from prior studies evaluating these interventions in middle and high school classrooms (see Carter et al., 2016; Carter, Moss, Hoffman, Chung, & Sisco, 2011). Peer support arrangements were implemented within a wide a range of classes, including both core academic (e.g., English, math, science, social studies) and elective (e.g., art, computer software, culinary arts, gym) classes.

Peer networks. Peer networks involved the creation of small, social groups comprised of 1-2 students with ASD and 3-5 peer partners. The students met together once per week outside of instructional time to participate in conversation and a shared activity (e.g., playing games, creating posters for school activities, drawing, watching or discussing anime videos). A secondary goal was to encourage informal connections among students outside of the formal meetings. The group was supported by a member of the school staff (e.g., school counselor, club

leader, special educator) who served as a facilitator during at least some of each regular meeting (e.g., checking on students' connections throughout the week, encouraging interactions during a shared activity, providing reminders about upcoming meetings). After selecting and inviting peer partners, the facilitator held an orientation meeting with all network members to discuss goals and expectations. Some schools opted to hold separate peer trainings as well. During meetings, peer partners modeled social skills and finding common interests to support the focal students socially. The facilitator employed strategies to encourage social interaction (e.g., highlight strengths, interpreting behaviors, redirecting conversations) and gradually faded direct involvement as the group coalesced. These procedures were adapted from our pilot studies and prior evaluations of these interventions in high schools (see Asmus et al., 2017; Gardner et al., 2014; Hochman et al., 2015). Although peer networks could meet anywhere, they most often took place outside of the cafeteria during lunch periods (e.g., empty classrooms, media centers) or were embedded within existing school clubs (e.g., Best Buddies® programs, anime club).

Training and coaching. A project coach provided training on both peer-mediated approaches to those school staff implementing the interventions, as well as to the entire school faculty at some interested high schools. Each coach used a standardized set of presentation slides, implementation manuals, and other key resources (e.g., sample peer support plans) to ensure consistency in content across sites. Although each training was designed to be approximately 45 min in length, they varied widely from 30 to 90 min in practice. The actual delivery of these trainings varied in format (e.g., with individuals, small groups, the whole school), timing (e.g., beginning of the year, in the midst of a semester when facilitators were identified), and frequency based on the preferences of school administrators, the availability of school staff, and the numbers of students chosen to receive each intervention.

The project coaches also provided some support to educators who facilitated the peer

support arrangements and peer networks. These coaches were present in intervention schools approximately one day each week throughout the school year. However, this coaching addressed all aspects of the CSESA intervention model (i.e., a 5-step process involving up to 11 interventions). As a result, additional coaching was scheduled only as needed for peer-mediated intervention facilitators. Coaching typically involved direct observation and follow-up discussion, but could also include modeling or other action (e.g., supporting the creation of peer support plans) as requested by school staff.

Measures and Data Collection

Numerous measures were collected as part of the overarching evaluation study. The present study focuses on data addressing student characteristics, implementation fidelity, and social validity.

Student characteristics. Information about the characteristics of students was gathered through demographic forms collected from families, student information forms collected from school staff, standardized assessments completed directly with students by research staff, and standardized assessments completed by teachers and parents.

Leiter International Performance Scales-Third Edition (Leiter-3). The Leiter-3 (Roid, Miller, Pomplun, & Koch, 2013) is a non-verbal intelligence test designed specifically for individuals ages 3 to 75 who may have difficulty with verbal directions. Four of the eleven subtests (i.e., figure ground, form completion, classifications/analogies, sequential order) are used to provide a brief non-verbal IQ assessment, which results in IQ scores with a mean of 100 and standard deviation of 15. The reliability on the four core subtests range from 0.67 to 0.95 for high school age individuals (Roid et al., 2013). The Leiter was administered with participating students at their school by project staff toward the beginning of the project; all research staff were trained to reliability.

Social Communication Questionnaire-Lifetime (SCQ-L). The SCQ-L (Rutter, Bailey, & Lord, 2003) is a 40-item questionnaire designed as a quick parent assessment of autism symptoms by measuring communication skills and social functioning. Each item is scored dichotomously (i.e., no or yes). Raw scores of 15 or greater suggest an individual would meet criteria for autism spectrum disorder. The SCQ has demonstrated concurrent validity with the Autism Diagnostic Interview-Revised, with correlations between the two measures ranging from 0.73 to 0.92 (Rutter et al.). A parent or caregiver completed the SCQ-L at the start of the study.

Social Responsiveness Scale-Second Edition (SRS-2). The SRS-2 (Constantino & Gruber, 2012) is a 65-item questionnaire used to assess autism symptomatology across five areas: social awareness, social cognition, social communication, social motivation, and repetitive behaviors and restrictive interests. Each item is scored using a 4-point, Likert-type scale ranging from 1 = *not true* to 4 = *almost always true*. The SRS-2 provides a T-score and cut off scores for mild (T = 60 to 65), moderate (T = 66 to 75), and severe (T = 76 and over) autism symptomatology. The test-retest reliability ranges from 0.77 to 0.85 (Constantino & Gruber). Scores also are derived for five treatment subscales: Social Awareness; Social Cognition; Social Communication; Social Motivation; and Restricted Interests and Repetitive Behavior. A familiar teacher completed the SRS-2 at the start of the study.

Vineland Adaptive Behavior Scales-Second Edition (VABS-2). The VABS-2 (Sparrow, Cicchetti, & Balla, 2005) is a 223-item scale assessing adaptive functioning across a variety of domains. It has a test-retest reliability of 0.86 and an internal consistency of 0.98 (Sparrow et al., 2005). The Vineland Adaptive Behavior Composite (ABC) and each of the domains have a mean of 100 and a standard deviation of 15. A teacher familiar with the target student completed 184 items across three domains (i.e., communication, socialization, daily living skills) using the Teacher Rating Form at the beginning of the study.

Implementation fidelity. Fidelity of implementation measures for both peer-mediated interventions were created in collaboration with the intervention developers and were aligned with other project fidelity measures to provide a uniform structure (i.e., dosage, preparation and structure, process, strategies and content, general strategies, evaluation and progress monitoring) across the multiple CSESA intervention components. Each measure contained items reflecting key elements of the specific intervention, along with indicators and descriptions of each element. Up to four response options were available for each element (see Tables 2 and 3). We used a sampling approach to gauge fidelity across schools and sites, in which the measure was completed three times during the first semester of implementation and one time during any subsequent semester of implementation at each school; this captured a subset of implementers and students. These measures were scheduled and collected by project coaches. For the present study, fidelity data was available for 51.5% of students involved in a peer support arrangement and 57.4% of students involved in a peer network.

Social validity. Social validity measures for both peer-mediated interventions were adapted with permission from the widely used Usage Rating Profile-Intervention (URP-I, Chafouleas, Briesch, Neugebauer, & Riley-Tillman, 2011). Each of the 22 items are evaluated using a 6-point, Likert-type scale ranging from 1 = *strongly disagree* to 6 = *strongly agree* (see Table 4). Items on both measures are organized within three sub-domains: coaching, training, and support; feasibility and acceptability; and usefulness and effectiveness. The measures were completed by educators involved in intervention implementation at the end of the semester. All measures were collected anonymously and linked to school and intervention, but not to individual students. For peer support arrangements, 41.2% were completed by general educators, 26.5% by special educators, 26.5% by paraprofessionals, and 5.9% by speech/language pathologists. For peer networks, 41.7% were completed by special educators, 19.4% by general

educators, 13.9% by speech/language pathologists, 8.3% by paraprofessionals, and 16.7% by other school staff (e.g., school counselor, school psychologist, district autism specialist).

Data Analysis

To address Research Question 1, we used descriptive statistics to characterize the sample of students who received at least one peer-mediated intervention. We then used analyses of variance (ANOVAs) to compare ratings across the four groups of students based on the interventions they were provided—peer support arrangement only, peer network only, both peer-mediated interventions, no peer-mediated interventions. We planned follow-up Tukey HSD comparisons when significant differences were evident. To address Research Question 2, we used descriptive statistics to summarize each dimension of intervention fidelity separately for peer support arrangements and peer networks. As a post hoc comparison, we examined whether variations in selected fidelity items were associated with diploma type, which provides an indicator of disability severity. To address Research Question 3, we used descriptive statistics to summarize individual item ratings. We used independent samples *t* tests to compare ratings across peer support arrangements and peer networks.

Results

What are the Characteristics of Students Participating in Peer-mediated Interventions?

Students receiving at least one or both of the peer-mediated interventions varied widely in their diploma pathways and characteristics (see Table 1), suggesting educators considered the interventions to be applicable across a diverse group of students. Half of students (50.0%) were working toward a standard diploma; the remainder were pursuing an alternative diploma. Across these students, nonverbal IQ scores ranged from 30 to 123 (*SD* = 26.5), suggesting students with severe cognitive impairments as well as those without an intellectual disability could participate. Likewise, large variations in autism-related symptomology were evident. Specifically, SCQ-L

scores ranged from 4 to 37 (*SD* = 7.9) and SRS-2 total scores ranged from 43 to 110 (*SD* = 12.4). Overall adaptive behavior scores (i.e., VABS-2) ranged from 35 to 119 (*SD* = 14.8).

Some student characteristics varied based on the interventions they were provided. Almost two thirds (65.9%) of students pursuing a standard diploma participated in a peer support arrangement only, 48.6% participated in a peer network only, and 25.9% participated in both interventions. The students receiving the standard diploma comprised over three quarters (77.1%) of the students who did not receive a peer-mediated intervention. Likewise, some differences in nonverbal IQ scores were apparent. An ANOVA identified significant differences across groups, $F(3, 138) = 2.71$, $p = .047$. Post hoc analyses indicated higher IQ scores for students who received no peer-mediated interventions versus students who received both peer-mediated interventions ($p = .026$); no other comparisons were significant. However, no differences were found between groups on the Social Communication Questionnaire-Lifetime ($p = .170$), SRS-2 total score ($p = .840$), or VABS-2 adaptive behavior composite scores ($p = .267$).

What Did Intervention Fidelity Look Like When Implemented by Secondary Educators?

For the majority of students for whom fidelity was sampled, peer support interventions were implemented at least three times in the prior two weeks, for at least 60 min each time, and over a period of at least eight weeks (see Table 2). Although every intervention involved an adult facilitator (e.g., paraprofessional, special educator) and at least one peer partner, other aspects of the intervention reflected more variations in implementation. For example, a sizable percentage of interventions did not include a written support plan (43.9%) or involve an initial orientation session (35.0%). The absence of a written support plan was more common for students pursuing a regular diploma (48.3%) than students pursuing an alternate diploma (33.3%). Likewise, the omission of an orientation occurred for the same students (48.3%) who were pursuing a regular diploma, but for fewer (16.7%) students pursuing an alternative diploma. Although some peer-

and adult-delivered support strategies were almost always observed, the combination of strategies used by each of these participants varied. Peer-delivered support strategies were observed more often for students pursuing a standard diploma, while adult facilitation strategies were observed more often for students pursuing an alternative diploma. Finally, while reinforcement was consistent, prompting and feedback/data collection was fairly inconsistent. No differences in pattern were apparent based on diploma pathway.

For the majority of students, peer networks were implemented at least twice in the past two weeks, for more than 20 min each time, and over a period of at least eight weeks (see Table 3). These interventions almost always involved an adult facilitator (e.g., special educators, general educators, counselors) and at least two peer partners who were present for some to all of the network meetings. Although formal orientation meetings were held for most students, they were not held for 44.4% of students pursuing a regular diploma and 28.6% of students pursuing an alternative diploma. Regular meetings in which students participated in shared activities were quite consistent. Lower fidelity ratings for meetings regarding peer networks were most often due to a lack of planning for upcoming meetings and explicit discussion of identified social goals. Although both reinforcement and prompting regularly occurred, the extent to which adults used at least one social facilitation strategy or faded their support to students/peer partners was less consistent and more common for students/peer partners pursuing an alternative diploma. The provision of feedback to student/peer partners and collection of data were highly variable for peer supports and peer networks.

How Do These Educators Assess the Social Validity of these Intervention Approaches?

Across all three subdomains of the Usage Rating Profile-Intervention, educator ratings supported the social validity of both intervention approaches (see Table 4). In the area of *Training, Support, and Coaching*, more than three quarters of respondents agreed or strongly

agreed that they understood the intervention procedures, had the skills needed for implementation, and considered the intervention directions to be clear. Views regarding the extent to which implementation support would be needed from co-workers, parents, or administrators was more mixed. Significant differences were found for just one item ("The ongoing support (e.g., coaching) provided for this intervention was useful."), $t(69) = 2.48$, $p = .016$, with higher ratings provided for peer networks.

In the area of *Feasibility and Acceptability*, most items were rated very highly. More than 90% of respondents agreed or strongly agreed that they liked the intervention procedures, felt the time requirements were reasonable, considered the intervention to be acceptable for students with ASD, and it was not disruptive. Somewhat lower percentages of respondents agreed that the intervention could be implemented exactly as described or that the time required for record keeping was reasonable. Significant differences were found for just one item ("This intervention would not be disruptive to other students."), $t(67) = 2.73$, $p = .008$, with higher ratings provided for peer networks.

In the area of *Usefulness and Effectiveness,* ratings were also high. More than 90% of respondents agreed or strongly agreed they were motivated to continue using the intervention, that it was a good way to support the social needs of students with ASD, that it promoted social and/or academic engagement, that it helped address existing IEP goals, and that it was beneficial for these students. Smaller percentages of respondents felt the intervention would save time spent on classroom management or help them collaborate with other school staff. No significant differences were found in ratings across interventions.

Discussion

The social dimensions of high school have long been highlighted for the importance to adolescents. We examined the student characteristics, fidelity of implementation, and social

validity associated with the delivery of peer support arrangements and peer networks across 15 high schools. The size and diversity of our sample, as well as the exploration of these three data sources, provide new insights into the application of these intervention approaches within high school settings. Our findings extend the literature in several ways.

First, peer-mediated interventions were implemented with a wide spectrum of students reflecting diverse characteristics and educational pathways. Although peer-mediated approaches have been advocated as promising interventions for addressing the social needs of adolescents with ASD (Cole, 2015; Watkins et al., 2015), actual examples of such a broad application have been limited in the literature. When considered alongside both implementation and social validity findings, reflection on the characteristics of the 102 students who received a peer support arrangement and/or peer network suggests these peer-mediated interventions do indeed have broad applicability. Participants included high school students with extensive support needs to students with above average abilities, as reflected in measures of nonverbal IQ, social impairment, adaptive behavior, and autism symptomology. Although additional experimental studies are needed to advance the field's understanding of which interventions are best suited for which students, our descriptive findings lend support for consideration of these interventions as approaches for addressing the social dimensions of the lives of students with ASD.

In the CSESA study, local school staff made decisions about which students received which interventions from a menu of available options. Such an approach aligns with typical practice in which educators make informed judgments about how best to meet the needs of their students. Although we did not ask educators why they selected certain intervention combinations over others, the patterns of student participation provide some insight into possible considerations. For example, peer-mediated interventions tended to be provided for students who had lower nonverbal IQs and were less likely to be pursuing a regular diploma. Students

pursuing an alternative diploma may have been perceived by educators as more in need of supplementary support, may have had schedules that allowed more flexibility to focus on social domains, and may have been participating in an already established school club or activity focused on social interaction with peers. Over three quarters of the students who did not receive peer-mediated interventions were pursuing a regular diploma. It may be that these students spent less time in general education classrooms where academic interventions are often prioritized, or that students pursuing a standard diploma were more reticent to participate in peer-mediated interventions. Future work is needed to better understand the factors educators consider when making social-focused intervention decisions (e.g., Knight, Huber, Kuntz, Carter, & Juárez, in press), as well as to delineate which of those factors are appropriate to consider. For example, Huber and Carter (2016) detailed a range of assessment approaches educators might use when determining which peer-mediated approach to adopt and how to tailor the intervention to meet the needs of individual students.

Second, peer support arrangement and peer networks appear to have been applied adequately—albeit flexibly—with these students. In other words, fidelity data indicate the peer-mediated interventions were implemented often, over time, and with most features observed. One promising facet of this finding is that it indicates typical educators can deliver these interventions in authentic settings without extensive external support from researchers. Indeed, the field has long lamented the advocacy of research-based interventions that are too difficult to implement within ordinary schools (Carter & Pesko, 2008; Malouf & Schiller, 1995; Snell, 2003). Yet some variations in implementation by these educators were clearly apparent. Without additional observational and outcome data, it is difficult to discern whether the variations in fidelity we reported are expected, desirable, or concerning. For example, it makes sense that the need for and delivery of specific support strategies by facilitators or peers would be shaped by

the context of the class, the activities students are working on together, and the experiences they have accrued over their time together. Moreover, facilitators sometimes involved additional (for peer support arrangements) or fewer (for peer networks) peer partners than suggested, implemented peer support arrangements class-wide to meet the needs of multiple students, or ran multiple peer networks concurrently. Such variations in fidelity have been similarly documented in other studies focused on high school students with severe disabilities and may reflect the sort of individualization so important to serving students with ASD (e.g., Asmus et al., 2017; Carter et al., 2016). The absence of a written peer support plan and the omission of initial orientation sessions for either intervention, however, could negatively influence the quality of the intervention. In looking more closely at student characteristics, we found that these intervention elements were omitted more often for students pursuing a regular diploma—students who likely had less extensive support needs. Perhaps educators felt the nature of these students' needs did not necessitate a formal plan or an explicit time of training for peer partners (e.g., Carter et al., 2017). Another possibility is that students pursuing a regular diploma had more discomfort with being singled out, and that educators omitted peer support plans or trainings to respect the feelings and opinions of their students. Future efforts to scale-up these interventions school- or district-wide should strive to delineate the extent to which particular intervention elements are considered critical or flexible for widespread implementation.

Third, both interventions were strongly affirmed by high school staff who were actively involved in their implementation. A large majority of educators—typically more than 90%—considered the two interventions to be feasible, acceptable, useful, and effective for delivery within their high school and with students with ASD. This particular portrait of social validity aligns well with other high school studies examining either of these intervention approaches (e.g., Asmus et al., 2017; Carter et al., 2016; Sreckovic et al., 2017), bolstering claims that peer-

mediated interventions align especially well with secondary school settings (Carter, in press; Huber & Carter, in press). The somewhat lower ratings related to the amount of record keeping for peer support arrangements—as well as lower fidelity on gathering data—was an issue we noticed anecdotally across other areas of the project. This may not be a familiar aspect of facilitating a peer-mediated social group and collecting data requires skills by the educator who values obtaining this information. At the same time, our study is the first to directly compare social validity ratings of these two interventions when carried out within the same set of high schools. We found few significant differences in educators' views of these two interventions. As part of future efforts to further enhance these peer-mediated interventions, it may be helpful for researchers to look more closely at the perspectives of those few educators who did not affirm particular aspects of the interventions to understand what refinements might need to be in place to address their concerns.

Limitations and Future Research

Additional research is needed to address several limitations of this exploratory study. First, we considered only a limited range of student characteristics in our analyses. Although we examined measures often omitted in other studies of peer-mediated interventions (e.g., autism symptomology, adaptive behavior, nonverbal IQ), we were not able to explore other factors that may influence decisions about which intervention to implement with a particular student. For example, a combination of student-level (e.g., student's IEP and transition goals, prior intervention experiences, challenging behaviors, social and academic skills), support-level (e.g., available staffing, educator's attitudes and confidence), and school-level factors (e.g., service delivery models, school climate) are likely to shape intervention decisions. Future studies should consider additional factors, as well as interview staff about their decision-making process. Second, we used a sampling approach when assessing fidelity of intervention, which provides

only a snapshot of implementation at a particular point in time. Although this was consistent with approaches used in other studies (e.g., Carter et al., 2016; Huber et al., in press), the fidelity of peer-mediated interventions likely fluctuates throughout the semester. Future studies might analyze more closely the day-to-day variations in intervention delivery (e.g., the ways in which supports are delivered by peer partners and adults; the use and fading of prompting, reinforcement, and feedback) and the factors that shape implementation. Third, our social validity measures were completed only by adults and we are missing the perspectives of participating students with ASD and their peers. Adolescents are likely to hold diverse views about the acceptability of these interventions (Bottema-Beutel, Mullins, Harvey, Gustafson, & Carter, 2016). Future studies should seek their perspectives on these interventions, as well as solicit their recommendations for enhancing the design and delivery within their schools.

This study addressed the implementation of peer-mediated interventions for high school students with ASD in classrooms and other school settings. Our findings indicate both peer support arrangements and peer networks can be implemented across a diverse range of adolescents in ways that are considered to be feasible and acceptable. For educators working in secondary schools, peer-mediated interventions present a promising approach for enhancing the social participation of students for whom strong connections to peers can be elusive.

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Table 1
Characteristics of Students with ASD by Types of Peer-Mediated Intervention They Received

Variables	Peer support arrangements	Peer networks	Both interventions	Neither intervention
Age[a]	15.9 (1.4)	16.0 (1.1)	15.9 (1.3)	15.7 (1.4)
Sex[b]				
Female	4 (9.8)	7 (20.6)	5 (18.5)	7 (14.6)
Male	37 (90.2)	27 (79.4)	22 (81.5)	41 (85.4)
Race[b]				
African American/Black	3 (7.3)	2 (5.9)	2 (7.4)	1 (2.1)
Asian American	2 (4.9)	1 (2.9)	0 (0.0)	0 (0.0)
American Indian/Alaskan Native	1 (2.4)	1 (2.9)	0 (0.0)	0 (0.0)
White	25 (61.0)	25 (73.5)	20 (74.1)	38 (79.2)
Multiple	5 (12.2)	1 (2.9)	2 (7.4)	3 (6.3)
Other	1 (2.4)	0 (0.0)	1 (3.7)	1 (2.1)
Not reported	4 (9.8)	4 (11.8)	2 (7.4)	5 (10.4)
Ethnicity				
Hispanic	4 (9.8)	5 (14.7)	3 (11.1)	7 14.6)
Annual family income[b]				
<20K	4 (9.8)	0 (0.0)	1 (3.7)	7 (14.6)
20-39K	4 (9.8)	6 (17.6)	3 (11.1)	5 (10.4)
40-59K	3 (7.3)	5 (14.7)	2 (7.4)	4 (8.3)
60-79K	9 (22.0)	1 (2.9)	2 (7.4)	7 (14.6)
80-99K	2 (4.9)	1 (2.9)	2 (7.4)	3 (6.3)
99K<	13 (31.7)	15 (44.1)	12 (55.6)	17 (35.4)
Not reported	6 (14.6)	6 (17.6)	5 (18.5)	5 (10.4)
Diploma pathway[b]				
Standard	27 (65.9)	17 (50.0)	7 (25.9)	37 (77.1)
Other	14 (34.1)	17 (50.0)	20 (74.1)	11 (22.9)
Leiter Nonverbal IQ[a]	83.6 (27.6)	84.5 (24.2)	73.3 (26.9)	99.1 (22.8)
Social Communication Questionnaire-Lifetime[a]	20.3 (8.1)	22.0 (7.5)	21.9 (8.2)	17.9 (9.2)
Social Responsiveness Scale (SRS-2)[a]				
Total T-score	71.0 (12.1)	69.9 (12.0)	72.4 (13.7)	72.1 (12.5)
Social Awareness T-score	64.8 (13.6)	62.9 (10.7)	68.4 (13.8)	67.8 (10.3)
Social Cognition T-score	68.2 (12.3)	68.1 (9.9)	70.9 (11.8)	69.7 (11.4)
Social Communication T-score	70.2 (10.5)	66.5 (11.8)	71.0 (13.0)	70.3 (10.9)
Social Motivation T-score	68.2 (12.5)	66.0 (10.4)	66.3 (13.3)	66.8 (12.8)
Restrict Interests/Repetitive Behaviors	71.2 (15.5)	71.7 (16.2)	74.0 (18.7)	75.7 (17.1)
Vineland Adaptive Behavior Scales-2[a]				
Communication SS	77.2 (16.2)	78.4 (19.3)	72.0 (13.9)	80.4 (15.4)
Daily Living SS	79.6 (16.1)	81.6 (19.0)	75.9 (16.1)	82.4 (16.3)
Socialization SS	72.2 (12.6)	73.2 (14.1)	70.0 (9.5)	72.5 (11.8)
Adaptive Behavior Composite	74.3 (14.8)	77.6 (16.6)	70.3 (11.6)	76.3 (14.6)

[a]Mean (standard deviation). SS= standard scores. [b]Frequency (percentage).

Table 2
Fidelity of Implementation for Peer Support Arrangements

	% rating			
Dimension of Fidelity	**0**	**1-2 times**	**3-6 times**	**6+ times**
Frequency *How often in the past two weeks has this student received this intervention/support?*	0.0	17.1	34.1	48.8
	0 min	**<30 min**	**30-60 min**	**> 60 min**
Amount *On average, how long were each of the sessions over the past 2 weeks?*	0.0	4.9	24.4	70.7
	0 weeks	**<4 weeks**	**4-7 weeks**	**8+ weeks**
Duration *For how long has this student receive this intervention/support?*	0	9.8	36.6	53.7
	Not observed	**Low**	**Mid**	**High**
Participants *One adult facilitator, at least one peer partner without ASD*	0.0	0.0	-	100.0
Peer support plan *Developed written peer support plan*	43.9	-	-	56.1
Orientation *Facilitator, peer partners, and student (if appropriate) participated in initial orientation meeting*	35.0	-	-	65.0
Peer support strategies *In close proximity to student for the majority of class period; provides academic support as needed (e.g., redirected, helped with materials, asked question); provides social support (e.g., initiated conversation, introduced to another peer)*	2.4	4.9	36.6	56.1
Adult facilitation strategies *Observes student and peer partners as they worked together; uses at least one social and/or academic facilitation strategy with students/partners during each class; provides constructive feedback to student/peer partners during each meeting*	2.4	22.0	39.0	36.6
Reinforcement *Demonstrates positive rapport with student; provides and directs reinforcement to student*	0	9.8	-	90.2
Prompting *Provides prompts if needed; provides appropriate wait time (facilitator only)*	7.3	29.3	-	63.4
Feedback and data *Checks in with peer supports (and student if appropriate); provides constructive feedback to student/peer partners; gathers some form of data*	5.0	32.5	45.0	17.5

Note. Not observed = no features observed; low = less than half (but at least 1 feature) observed; mid = half or more features were observed; high = all features were observed. - = rating not possible. ASD = autism spectrum disorder.

Table 3
Fidelity of Implementation for Peer Networks

	% rating			
Dimension of Fidelity	**0 times**	**1 time**	**2+ times**	
Frequency *How often in the past two weeks has this student received this intervention/support?*	0.0	17.9	82.1	
	0 min	**1-10 min**	**11-20 min**	**> 20 min**
Amount *On average, how long were each of the sessions over the past 2 weeks?*	1.8	0.0	3.5	94.7
	0 weeks	**<4 weeks**	**4-7 weeks**	**8+ weeks**
Duration *For how long has this student receive this intervention/support?*	0	5.4	14.3	80.4
	Not observed	**Low**	**Mid**	**High**
Participants *Network has one adult facilitator; network has at least two peer partners without ASD*	1.8	16.1	-	82.1
Meetings *Focus student and at least 2 peer partners present for majority of the meeting*; *facilitator present for at least 25% of meeting*	3.6	21.4	-	75.0
Orientation *Facilitator, peer partners and student participate in initial orientation meeting*	38.6	-	-	61.4
Meetings *Engage in a shared activity (student & peers)*; *discuss dates and activities of upcoming meetings; addresses social-related goal(s)*	0.0	20.0	21.8	58.2
Adult facilitation strategies *Uses at least one social facilitation strategy with student/partners; fades involvement as appropriate*	10.7	35.7	-	53.6
Reinforcement *Demonstrates positive rapport with student; provides and directs reinforcement to student*	0.0	16.1	-	83.9
Prompting *Provides prompts if needed; provides appropriate wait time (facilitator only)*	7.3	18.2	-	74.5
Feedback and data *Tracks social contacts; provides constructive feedback to student/peer partners*; *gathers data on social-related goal*	18.2	40.0	21.8	20.0

Note. Not observed = no features observed; low = less than half (but at least 1 feature) observed; mid = half or more features were observed; high = all features were observed. - = rating not possible. ASD = autism spectrum disorder.

Table 4
Social Validity Ratings for Peer Support Arrangements and Peer Networks

	Peer support arrangements		Peer networks	
Items	Agree/ Strongly agree (%)	*M* (*SD*)	Agree/ Strongly agree (%)	*M* (*SD*)
Training, Coaching, and Support				
The training provided for this intervention was useful.	88.2	5.4 (0.7)	94.6	5.6 (0.6)
The ongoing support (e.g., coaching) provided for this intervention was useful.	76.5	5.0 (1.1)	94.6	5.5 (0.6)
I understand the procedures of this intervention.	88.2	5.2 (0.7)	97.3	5.5 (0.6)
I have the skills needed to implement this intervention.	94.1	5.4 (0.7)	97.3	5.6 (0.5)
The directions for using this intervention are clear to me.	85.3	5.2 (1.0)	97.3	5.5 (0.6)
Implementation of this intervention would require support from my coworkers.	70.6	4.7 (1.4)	75.7	5.0 (1.2)
Parental collaboration is required in order to use this intervention.	60.6	4.4 (1.3)	37.8	4.0 (1.4)
I would need support from my administrator to implement this intervention.	47.1	4.3 (1.4)	54.1	4.3 (1.4)
Feasibility and Acceptability				
The amount of time required to use this intervention is reasonable.	76.5	5.1 (0.9)	89.2	5.3 (0.8)
I would implement this intervention with a good deal of enthusiasm.	94.1	5.6 (0.6)	94.6	5.6 (0.6)
The intervention could be implemented exactly as described.	82.4	5.1 (1.0)	78.4	5.2 (0.9)
The amount of time required for record keeping with this intervention is reasonable.	65.6	4.8 (1.1)	83.3	5.2 (0.9)
This is an acceptable intervention strategy for the needs of students with ASD.	93.9	5.5 (0.7)	97.2	5.6 (0.6)
This intervention would not be disruptive to other students.	93.9	5.2 (0.7)	97.2	5.6 (0.5)
I liked the procedures used in this intervention.	90.9	5.4 (0.7)	94.4	5.5 (0.6)
Usefulness and Effectiveness				
This intervention is a good way to support the social needs of students with ASD.	93.9	5.5 (0.7)	97.2	5.7 (0.5)
This intervention promoted academic and/or social engagement.	90.6	5.4 (1.0)	100.0	5.7 (0.5)
Use of this intervention would save time spent on classroom management.	80.6	5.2 (0.9)	65.7	4.9 (0.8)
This intervention helped to address the student's existing IEP goals.	93.3	5.4 (0.7)	86.1	5.2 (0.8)
This intervention helped me to collaborate with other staff.	75.0	5.0 (0.9)	83.3	5.2 (0.7)
I am motivated to continue using this intervention.	90.9	5.5 (0.8)	100.0	5.7 (0.5)
Overall, the intervention is beneficial for students with ASD.	90.9	5.5 (0.8)	100.0	5.7 (0.5)

Note. Percentages are based on the number of individuals completing each item. 1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, 6 = strongly agree.