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Technology delivered self-monitoring application to promote successful inclusion of an elementary student with autism

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ABSTRACT
The ever-increasing prevalence of children diagnosed with autism spectrum disorder (ASD) is paralleled in public educational settings, including general education classrooms. Challenges with social/behavioral functioning, including limited self-management and behavior inhibition, can lead to off-task and disruptive behaviors that interfere with acquisition of academic and social skills. Without effective and efficient interventions, opportunities to participate in inclusive settings will likely be reduced. Self-monitoring (SM) is an intervention with strong evidence for increasing prosocial behaviors and decreasing challenging behaviors for students with ASD in educational settings, although the cuing mechanisms (e.g., timers, stopwatch) and tracking materials (e.g., paper, pencil) can be cumbersome and obtrusive. I-Connect is an SM application that allows for customizable prompts, recording, and data monitoring. The purpose of this study was to evaluate, utilizing an ABAB design, the functional relationship between implementation of I-Connect SM intervention and increases in on-task behavior with concurrent decreases in disruptive behavior for an elementary student with ASD in a general education classroom. Results indicate an immediate increase in on-task behavior as well as a decrease in disruptive behaviors with each introduction of I-Connect. Implications for practice and future research are discussed.

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KEYWORDS
autism spectrum disorder; classroom; self-monitoring intervention

Introduction

The prevalence of autism spectrum disorder (ASD), a neurodevelopmental disorder characterized by deficits in communication, socialization, and restricted interests and behaviors (Heflin & Alaimo, 2007; Lord et al., 2000), continues to rise with most recent estimates of more than one in 70 children diagnosed (Center for Disease Control and Prevention [CDC], 2014). This increase coupled with the continued focus on inclusion rate has resulted in a sharp increase in the number of children with ASD being served in general education classrooms (Crosland & Dunlap, 2012; Symes & Humphrey, 2010).

Though students with ASD may demonstrate academic capabilities equal to their peers, there is typically a discrepancy between academic and social/behavioral functioning (Moore, 2007; Symes & Humphrey, 2010). Poorly developed self-management skills, such as difficulty controlling and inhibiting actions, can lead to off-task and disruptive behaviors (Adreon & Stella, 2001; Wilkinson, 2008). Challenging behavior may contribute to difficulties with academic skill acquisition, as well as interfere with development of positive relationships with peers and teachers (Robertson, Chamberlain, & Kasari, 2003). Moreover, disruptive behavior is positively correlated with poor teacher–student relationships and decreased opportunities for inclusion with neurotypical peers (Robertson et al., 2003). These difficulties, coupled with the complex cognitive and behavioral profiles of individuals with ASD, present a heightened need for effective and efficient evidence-based practices (EBP).

Self-monitoring (SM) is one such intervention with evidence for increasing prosocial behaviors and diminishing challenging behaviors (Dunlap et al., 1995; Lee, Simpson, & Shogren, 2007). SM represents the process of attending to one's own actions and recording the presence or absence of a specified behavior (Mace, Belfiore, & Hutchinson, 2001). SM interventions offer promise for promoting student independence in meeting academic and behavioral goals (King-Sears, 2008) while potentially requiring less support from a teacher or paraprofessional (Crutchfield, Mason, Chambers, Wills, & Mason, 2014; Southall & Gast, 2011). SM interventions have been applied to a variety of behaviors for students with ASD in the general education setting including remaining on-task (Cihak, Wright, & Ayres, 2010; Rock & Thead, 2007), following rules (Agran, Sinclair, Alper, Cavin, & Wehmeyer, 2005), utilizing functional communication (Hughes et al., 2002), and increasing social interactions (Reynolds, Gast, & Luscre, 2013; Shearer, Kohler, Buchan, & McCullough, 1996).

Unfortunately, the cueing components (e.g., timers, chimes, and stopwatches) and SM mechanisms (e.g., paper and pencil, wrist counters, hand-tally counters, timers, and stopwatches) can be obtrusive and socially distracting in the general education classroom (Crutchfield et al., 2015). Technological innovations allow cues to be delivered to students silently and visually (e.g., flashing reminders) or silently

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through a tactile cue (e.g., Motivaider). Moreover, handheld devices such as cell phones, tablets, computers, and iPads are commonly incorporated in classroom settings, are socially acceptable, and can be inconspicuous, offering significant advantages in supporting SM implementation. First, handheld technologies typically have timing programs that can deliver prompts at predetermined intervals, as well as the storage capability to store SM responses for recordkeeping purposes. Moreover, the use of technology tends to be preferred, likely due to the predictability and decreased need for dependence on others for implementation (Golan & Baron-Cohen, 2006; Goodwin, 2008).

I-Connect (Wills & Mason, 2014) is an SM application (app) loaded on Android-compatible handheld tablets and cell phones. The I-Connect program delivers customized prompts (e.g., chime, flashing screen, tactile) at specified intervals using behavior-specific questions (e.g., Are you working?; see Figure 1). Once prompted by the tablet, the user records the occurrence or non-occurrence of the behavior by pressing either yes or no in response to the behavior question. Although other studies have indicated the use of handheld devices to deliver the prompt at specified intervals (Blood, Johnson, Ridenour, Simmons, & Crouch, 2011; Cihak et al., 2010) or as a means of recording the occurrence or non-occurrence of a behavior (Gulchak, 2008), I-Connect is the only application known to these authors that is specifically designed for prompting, recording, and data monitoring.

Although promising, the evidence-base for I-Connect is limited. Wills and Mason (2014) demonstrated a functional relationship between the use of I-Connect and increases in on-task behavior and decreases in disruptive behavior for two high-school students, one with a specific learning disability and one with ADHD, in a general education setting. Crutchfield and Collagues. (2014) utilized I-Connect SM to decrease hand and mouth stereotypy for two middle-school students with ASD in a self-contained classroom. Remarkably, both studies demonstrated notable changes in the target behavior with the implementation of I-Connect without reinforcement contingent on demonstration of behavior change or accuracy of SM. However, research evaluating the efficacy of I-Connect for younger students in educational settings is not currently available.

The purpose of this study is to evaluate the effectiveness of I-Connect for an elementary student with ASD in a general education setting. Specifically, this study sought to determine if there is a functional relationship between implementation of I-Connect SM intervention and increases in on-task behavior and decreases in disruptive behavior for a student with ASD in a general education classroom.

Method

Participant, setting, and materials

Participant

The participant was a 9-year-old African American male, in the third grade with a diagnosis of high functioning autism. He demonstrated observable linguistic/social deficits and stereotypy consistent with the diagnosis. The student participated in the general education classroom the majority of the day, unless he was removed due to challenging behavior. He received average to above-average grades with classroom supports, such as modifications to class assignments and homework. During academic sessions in the general education classroom, the participant would become disengaged and exhibit off-task behavior as evidenced by sitting facing away from his desk and engaging in self-stimulatory behaviors such as opening and closing his mouth, flexing his neck muscles, rolling his head, and rocking in his chair. While engaging in these behaviors, he was not focused on academic tasks (e.g., completing a problem in his workbook, listening to the teacher lecture, looking at the Smartboard, reading an assigned passage in his book, etc.). Additionally, the participant demonstrated distracting audible behaviors including humming and/or singing in the middle of a lecture, playing noisily with objects on his desk (e.g., paper, workbook, pencil, action figures, etc.), and hitting himself in the head several times with his books. When such behaviors occurred, the teacher would first attempt to redirect him toward the task. If this did not work, then the student's behavior would be ignored or the school's behavioral support staff would be notified and he would be removed from the classroom.

Setting

The study was conducted in an urban, Title-I elementary school located in the Midwest United States. The Title I (Part A) Elementary and Secondary Education Act provides financial assistance to local schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards (U.S. Department of Education, 2014). The elementary school's total K–5-grade population consisted of 290 students with 82.6% minority enrollment and 81.5% of students qualifying for free/reduced lunch. The study was conducted in a third-grade general education classroom with 25 students. One general education teacher staffed the classroom. The lesson structure varied between group lessons, independent seatwork, and small group work. The student's desk was located in the corner of the classroom.

Materials

I-Connect is an Android application designed to help students to self-monitor their behaviors within a classroom. The application was installed on to a 3 × 5 inch Samsung Galaxy Player 5.0 handheld tablet. The tablet had wireless Internet capabilities, but did not have 3 G-cellular connectivity. The device was tested to ensure Internet connectivity and that the application worked properly in the student's classroom location. Prior to the training session, the device was configured to ask the participant the same question at a 30-second interval. The prompt being displayed was "Are you on task?" with a yes/no option as a response (see Figure 1). The type of prompt utilized was a flashing screen.

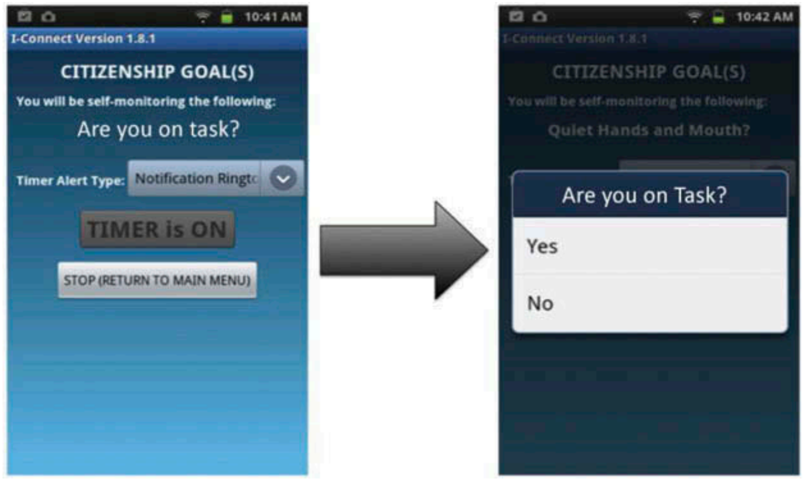

Figure 1. Screenshot of I-Connect prompt.

Experimental design and measurement

An ABAB single-subject withdrawal design (Kazdin, 1982) was used to evaluate the functional relationship between the implementation of I-Connect SM intervention and changes in the participant's on-task and disruptive behaviors within his math classroom. Although withdrawal designs may include only one participant, this type of design is capable of demonstrating strong experimental control (Byiers, Reichle, & Symons, 2012; Horner et al., 2005; Kratochwill et al., 2013) when systematically implemented. To ensure maximum experimental control, the study design adhered to quality standards as established by the What Works Clearinghouse (WWC) including a minimum of four phases providing evidence of effect at three different points in time, no fewer than five data points per phase to verify a "pattern of behavior," and methodical introduction and removal of the intervention (Byiers et al., 2012; Horner et al., 2005; Kratochwill et al., 2013).

Measurement

Dependent variables

The primary dependent variable in this study was the percentage of time the participant was on-task in each 15-minute observation period. On-task was defined as the student actively listening to teacher instruction as characterized by: orientating toward the teacher or relative task materials (e.g., textbook, worksheet, paper), responding verbally (e.g., answering questions aloud) or nonverbally (e.g., writing answers down), or seeking help in an appropriate manner (e.g., raising hand). The participant was recorded as off-task if he turned away from the teacher or related task materials and/or was obviously attending to other stimuli in the environment (i.e., looking at his peers, staring out the window, playing with items on or in his desk). Continuous recording was used during observation periods to determine the percent of time the student was on-task during the 15-minute observation period.

The second dependent variable was the frequency of disruptive behavior. Disruptive behavior was defined as a behavior that was potentially disruptive to classroom instruction and was not in compliance with classroom expectations. This included verbal behaviors such as making noises that were preventing the student from staying on-task or was distracting to classmates (e.g., singing and humming). Disruptive behaviors also included deliberate physical or motor display of inappropriate behavior (e.g., rocking in chair, hitting head with a book, tapping an object). A separate incident of behavior was recorded for the same type of behavior (e.g., humming) if there was a minimum of three seconds between the end of one behavior and the onset of the next.

The Multiple Option Observation System for Experimental Studies (MOOSES; Tapp, Wehby, & Ellis, 1995) program on a tablet, was utilized for data collection during all phases of the study. MOOSES allowed for continuous duration and event recording of student behavior along a real-time continuum.

Interobserver agreement

Two observers, the first author and a second research assistant trained in the data collection procedures, collected data independently but concurrently for 100% of baseline sessions and 20% of sessions in all other phases. The investigators were trained to a 90% interobserver agreement rate on each behavior code prior to collecting data for this study. Observer training consisted of a quiz on the operationally defined definitions, independent practice coding videos, and coding in a classroom with an observer previously trained to reliability. Once the training criterion had been reached, the investigators collected data either as a primary or secondary data collector. IOA was calculated by dividing the total number of agreements by agreements plus disagreements and multiplying by 100 for each target behavior. The mean IOA for on-task and disruptive behavior was 91% (73–100%) and 95% (75%-100%), respectively.

Treatment fidelity

Treatment fidelity was assessed for 100% of intervention sessions by the first author. The steps assessed included (a) a device with individually programmed I-Connect was given to the student before the start of the session; (b) prior to launching the I-Connect device the student was prompted to begin working and start his I-Connect device; (c) prompts to remain on-task, keep working, and/or discontinue disruptive behavior were not provided; (d) reinforcement contingent on use of the device, accuracy, on-task behavior, or the absence of disruptive behavior was not provided. The rater responded yes or no to each item following the conclusion of the observation. Treatment fidelity was calculated by dividing the total number of "yes" responses by the total number of items.

In addition to assessment of overall treatment fidelity, individual fidelity of use was also assessed. Individual fidelity was defined as responding to the program's prompts. I-Connect uploads the participant's SM data, including responses and non-responses to a web-based, password protected site. Fidelity of use for each session was calculated by dividing the total number of responses by total number of response opportunities.

Social validity

At the conclusion of the study, the participant and teacher were asked to complete a satisfaction rating scale. The two-part satisfaction survey (Crutchfield et al., 2015) consisted of items based on perceived changes in behavior such as task initiation, remaining on task, task completion, correct responding, and refraining from disruptive behavior. The 5-point response options for these items ranged from (1) "Was much worse than before" to (5) "Was much better than before." The second part of the survey consisted of three questions and asked the respondent to answer based on comparisons with other interventions that had been implemented for the same behaviors and included an item for each of the following: (a) ease of use, (b) student's desire to continue using the intervention, and (c) the teacher's desire to continue using the intervention. The 5-pt response options for these items ranged from (1) "much less than other interventions" to (5) "much more than other interventions."

Procedures

The first author, a graduate research assistant, collected data for all sessions. A second research assistant helped the first author to collect IOA data. Data were collected in the afternoon during a regularly scheduled math lesson with a mix of group and independent activities. Observations were conducted in 15-minute interval approximately 2–3 times a week.

Baseline

Baseline data were collected during the participant's math class. The 15-minute observation sessions occurred during typical classroom activities, including group lessons, independent seatwork, and small group work. Throughout baseline, the participant did not receive any formal behavior modification and was not provided with an I-Connect self-management device. A minimum of five data points was collected per phase.

I-Connect SM training

After a minimum of five data points was collected and a stable pattern of responding was established, without a trend in the direction of desired change (Kratochwill et al., 2013), training in the use of I-Connect, the intervention, was introduced. The participant was trained in three 20-minute sessions and was required to answer the prompts independently for at least 80% of the intervals before moving on to the intervention phase. If the 80% mastery criterion was not achieved, then another training session would be implemented. The participant had no prior training or experience with using an IT device (e.g., smartphone, iPad, etc.) for academic or intervention purposes. The training in how to open the I-Connect app on the handheld tablet, enter classroom information, and begin behavioral monitoring was conducted in the elementary school library. Prior to the training session, the application was configured to ask the participant the same question at a 30-second interval. The prompt being displayed was "Are you on task?" with a yes/no option as a response. The trainer explained the rationale for on-task behavior and the trainer provided three examples (sitting quietly, paying attention to the teacher, doing your work, etc.) and non-examples of on-task behavior. The participant was then instructed to identify three examples and three non-examples of appropriate on-task behavior (mixed to 100% accuracy). After successfully completing this task, the participant was given an opportunity to discuss and ask questions and/or express concerns. Once the training was completed, the student began his work in the same manner as baseline but with the researcher present for support. The researcher waited until the device displayed the question and then he or she prompted the participant by saying, "Answer your question." For each interval, the researcher gave the student 3 seconds to respond independently before providing a verbal prompt. Once the student answered the questions independently for 80% of the intervals during the training session, the training phase was complete.

Intervention

Once the participant met the 80% criterion established during training, the intervention began. At the beginning of each data collection session, the device was placed on the left-hand corner of the participant's desk and he was prompted to start the I-Connect application. If no response was selected within 20 seconds, the response option would disappear and the 30-second interval was initiated by the application. Verbal prompts to respond to the questions were no longer provided by the teacher or interventionists. No reinforcement was provided for responding to I-Connect prompts, accuracy of responding, or engaging in the target behaviors.

Withdrawal

Following a minimum of five data points and evidence of a stable pattern of behavior, the withdrawal phase was implemented. The participant was informed that the device would not be made available to him for several sessions. This phase was controlled in the same manner as the baseline phase. There were no behavioral guidelines required and/or given to the participant during the sessions of this phase. The participant was not instructed to refrain from using other SM techniques, but he did not demonstrate any observable forms of SM. Following a minimum of five data points and a demonstrated pattern of stable behavior, the I-Connect intervention was reintroduced.

Data analysis

Visual analysis of data as displayed graphically was used to evaluate the functional relationship between the I-Connect intervention and increases in on-task behavior as well as decreases in the frequency of disruptive behaviors. This analysis involved visually identifying changes in mean, trend, and variability between adjacent phases.

Results

On-task

Figure 2 is a graphical display of the participant's data for all phases of the study. The *x*-axis indicates the session and the *y*-axis indicates the percentage of time on-task during the 15-minute observation. The vertical phase change lines indicate the introduction and withdrawal of the I-Connect intervention. Initial review of the graphical display clearly indicates the design meets quality standards and demonstrates experimental control as evident by a minimum of five data points per phase, a clear pattern of behavior without a trend in the direction of desired change prior to phase changes, and three demonstrations of change (Kratochwill et al., 2013)

Visual analysis of baseline data indicates a low rate of total on-task behavior with some variability. The data indicate that the participant was on-task an average of 22.45% during baseline, however the data is quite variable and ranges from 0%–76.3% of time on-task. With the introduction of the I-Connect SM device, an immediate increase in the level of on-task behavior (*m* = 83.1%, 74.8%—89.4%) is apparent. Additionally, it is visually apparent that the percent of on-task behavior became more consistent during intervention as is evident by the stability of data during intervention compared to the instability of baseline. Withdrawal of the I-Connect intervention resulted in an immediate return to baseline levels of on-task behavior (*m* = 30.3%, 1.9%–54.1%) with variability. The second systematic introduction of I-Connect, again, resulted in an immediate increase in the level of the percent of on-task behavior (*m* = 89.6%, 63.9%–97.4%), as is evident by the clear intercept gap and stabilization of the data.

Disruptive behaviors

Results for frequency of disruptive behavior, across all phases, are graphically displayed in Figure 3. The *x*-axis indicates the

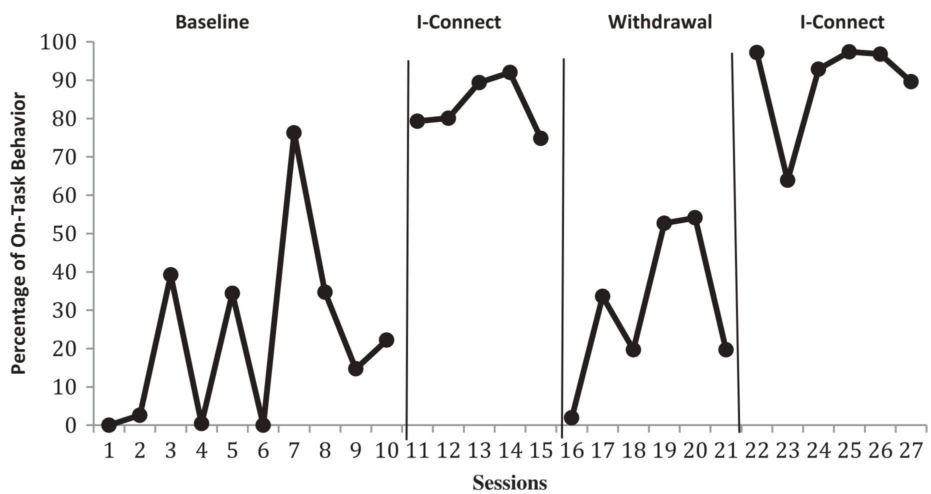

Figure 2. Graphical display of participant's percentage of time on-task.

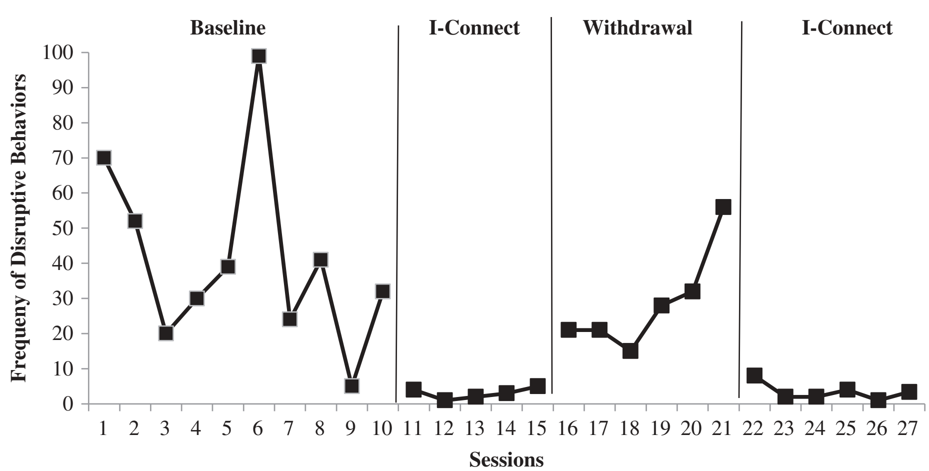

Figure 3. Graphical display of participant's frequency of disruptive behavior.

treatment session and the *y*-axis indicates the frequency of disruptive behaviors. The vertical phase change lines indicate the introduction and withdrawal of I-Connect.

Visual analysis of baseline data for the participant indicated a high frequency of disruptive behavior. Though the data were variable during baseline, the participant demonstrated an average of 41.2 disruptive behaviors per session, ranging from 24 to 100 disruptive behaviors. Visual analysis indicates the introduction of the I-Connect device resulted in an immediate decrease in levels of disruptive behaviors, as is evident by the clear intercept gap. The frequency of disruptive behavior also stabilized across sessions, not exceeding more than five disruptive behaviors (m = 3.2, 1–5) in any single session. Withdrawal of I-Connect resulted in an immediate increase in frequency of disruptive behaviors, which remained relatively stable for the first three data points and then began an ascending trend. Although the mean frequency of disruptive behaviors (m = 28.8, 15–56) was not as severe as those observed during baseline, it is visually clear that they increased beyond what was observed during the initial implementation of I-Connect and within the range of that which was observed during baseline. The large intercept gap and decrease in the level of disruptive behaviors (m = 3.4, 1–5) is visually evident with the second systematic introduction of the I-Connect intervention, again, resulting in a dramatic and immediate decrease in frequency of disruptive behaviors.

Treatment fidelity

The treatment fidelity measure including all intervention steps was completed by the first author at the end of each session. Measurement of treatment fidelity as described above was obtained for 100% of the intervention sessions. Fidelity of implementation across all sessions was 100%. Fidelity of use of the I-Connect application by the participant was also assessed across all sessions. For the first intervention phase, participant responded to the device an average of 87%, ranging from 76%–100%. During the second intervention phase, the participant responded an average of 91%, ranging from 83%–100%.

Social validity

The participant completed the student satisfaction rating scale form at the end of the study. The Participant's ratings resulted in a mean rating of 4 (range = 3–5). The participant's ratings indicated the I-Connect application helped him with completing his work and staying out of trouble (rated a "5" for both, which indicated "a lot better than before"). The lowest scores were reported for the items "When I use the I-Connect application, it helped me with getting started with assignments" and "When I use the I-Connect application, it helped me with getting the answer right." Both items received a score of 3 ("was a little easier than before"). The participant reported high levels of satisfaction with I-Connect compared to other interventions designed to assist him in class. The participant described the intervention as "fun" and "easy to use." He also suggested working was "easier" when he was using I-Connect.

Upon completion of the study, the participant's teacher also completed the teacher satisfaction rating scale. Her responses yielded an average rating of 5 (range = 5–5); the participant's behavior was "a lot better than before" in regards to on-task behavior, getting started with assignments, completing work, work accuracy, and classroom disruption (all were rated a 5, which indicated "was a lot better than before"). Her ratings indicated that when using the I-Connect application with her student, she thought the ease of implementing the intervention, the students desire to use the intervention, and her desire to continue the intervention was "much better" than other interventions (all were rated a 5, indicating "much better than other interventions"). She expressed that she liked that the intervention was "strictly for him and there are no distractions for other students" and added, "it motivated this student to do better." When asked, "what features would have improved this intervention?" she noted, "I wish he could have started using the device sooner."

Summary and discussion

The continual rise in the prevalence of ASD and subsequent increases in the number of students with ASD educated in general education classrooms necessitates identification of efficacious interventions that require fewer personnel resources (National Autism Center, 2009). Furthermore, there is even more empirical support for behaviorally-based interventions for children and adolescents with ASD (National Autism Center, 2015). I-Connect, an SM application, is potentially one such intervention. I-Connect capitalizes on the increased utility of mobile technology as the delivery agent for an evidence-based intervention (SM), which has been proven effective for targeting a variety of behaviors in educational settings for individuals with ASD (Lee et al., 2007).

Due to the study's high level of experimental control and resulting strong internal validity (Kratochwill et al., 2013), the functional relationship between the implementation of I-Connect and increases in the percentage of time on-task with concomitant decreases in frequency of disruptive behaviors was supported for one elementary school student with ASD in the general education classroom. The participant demonstrated an immediate increase in on-task behavior and a decrease in disruptive behaviors with both introductions of the I-Connect intervention, whereas the absence of I-Connect yielded a decrease in on-task behavior and increase in disruptive behavior. Given these results, the use of I-Connect shows potential for future research and implementation for the elementary-age population with ASD.

Further, the ease of use of I-Connect increases the utility of SM as an intervention, particularly in a general education classroom. Once the tablet was loaded with the I-Connect application and programmed with specified intervals and the target question, few other steps were necessary to ensure implementation fidelity. The interventionist merely had to instruct the student to start the I-Connect program and then assistance from an outside agent was no longer necessary. The student was able to independently monitor his behavior, as is demonstrated by the fidelity of use data, allowing the teacher to utilize the time for classroom instruction rather than behavioral management, while also providing increased autonomy for the student.

An additional strength of this study is the strong social validity, as demonstrated by high ratings from both teacher and student. The student ratings are consistent with previous literature indicating technology delivered interventions are typically well received by individuals with ASD (Golan & Baron-Cohen, 2006; Goodwin, 2008). Evidence of teacher acceptability of interventions utilizing handheld technology is critical as schools and districts grapple with handheld device proliferation at younger ages and grades. It is encouraging that the teacher rated the intervention as acceptable, not distracting, and preferred it over other interventions.

Limitations

Although this study does demonstrate strong experimental control, the inclusion of only one participant limits the conclusions that can be drawn beyond the parameters of the current investigation. Yet, the positive results are consistent with previous studies demonstrating the efficacy of I-Connect with older students with ASD (Crutchfield et al., 2015) and other disabilities (Wills & Mason, 2014). The outcomes for this current study, including changes in the target behavior, high treatment fidelity, and strong social validity, provide impetus for continued investigation of the I-Connect intervention with this population.

Another limitation of this study is the brief, 30-second intervals, schedule of prompting. While brief intervals are common to the SM intervention literature (Mason & Davis, 2013), it is unknown if similar results could have been obtained with longer intervals and thus, fewer task interruptions for the SM task. While shorter intervals were indicated by the high frequency of disruptive behaviors and low rates of on-task behaviors by the participant at study onset, it is unknown if fading procedures could have allowed for lengthening of prompt latency with eventual fading of the SM process. Future studies of SM should investigate the relationship between interval frequency and targeted behaviors.

As the study was conducted in a typical classroom, instructional activities varied during data collection periods across all phases. This is a limitation due to the fact that the results could have been affected by the variability of such activities (e.g., the first 15 minutes versus the last 15 minutes) and may have negatively impacted stability of within-phase results. However, the ABAB withdrawal-design helps to demonstrate experimental control, as seen in the results, which showed that there was a significant change between phases regardless of the activities conducted during the sessions.

Implications for future research

In addition to addressing the limitations of this study, including replication with more than one participant and investigating interval frequency, future research of the I-Connect SM intervention with individuals with ASD is warranted. Studies that give focus to contextual variables that impact outcomes would assist in determining the efficacy of the I-Connect intervention. As previously noted, implementation of current EBP for intervening with individuals with ASD requires a great deal of outside support from others, increasing dependency, and decreasing generalizability (Ganz, 2007; Morrison, Kamps, Garcia, & Parker, 2001). Given the portability as well as the self-sufficiency of I-Connect, exploration of its use beyond classroom behaviors could prove advantageous. For instance, future research should explore the functional relationship between I-Connect and changes in target skills related to social-communication, flexibility, independent living, and organization.

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