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The Impact of Self-Monitoring using I-Connect for Increasing On-Task Behavior for Students with or at risk of an Emotional Behavioral Disorder

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The Impact of Self-Monitoring Using I-Connect for Increasing On-Task Behavior for Students with or at risk of an Emotional Behavior Disorder

by

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ABSTRACT

The use of technology-based self-monitoring interventions is becoming more popular, increasing the likelihood that self-monitoring interventions will have greater contextual fit within classrooms. Self-monitoring has resulted in increases in desired school behaviors, such as increases in on-task behavior, academic performance and task completion, for students diagnosed with disabilities. The purpose of this study was to extend the findings from Clemons et al. (2016) and examine student and teacher use of a web-based self-monitoring application, I-Connect, and reinforcement to increase on-task behavior for upper-level elementary school students with or at risk for an emotional behavioral disorder (EBD) using extended self-monitoring intervals. Significant increases in on-task behavior as a result of the I-Connect plus reinforcement intervention in the classroom were demonstrated for all three participants.

CHAPTER ONE:

INTRODUCTION

Students with disabilities such as emotional behavioral disorders (EBD), autism spectrum disorder (ASD), learning disabilities (LD) or attention deficit/hyperactivity disorder (ADHD) have statistically been recognized to contact considerably lower success within the school system and post-school outcomes compared to neurotypically developing students (Estrapala et al., 2018; Konrad et al., 2007; Sullivan et al., 2020). In 2010, the U.S. Department of Education established the Individuals with Disabilities Education Act (IDEA) to promote optimal student outcomes following the conclusion of secondary school, by ensuring that students with disabilities are provided with equal, appropriate, and free education. However, problem behavior such as attention difficulties, non-compliance, low self-control, aggression, and tantrums are among the most widespread cause for the removal of students with disabilities from inclusive classrooms (Estrapala et al., 2018). The marginalization of students from general education classrooms leads to a negative impact on peer interaction and social development, in turn, causing a decrease in academic performance (Strain et al., 2011). Further, students who continue to engage in these behaviors might eventually be faced with more extensive problems such as rejection from peers, social isolation within educational and noneducational environments, and struggles with creating and maintaining intimate interpersonal relationships with peers and teachers (Lee et al., 2007).

Behavior modification procedures such as contingency management (Hoff & DuPaul, 1998; Kazdin, 1979) and differential reinforcement of other behavior (DRO; Restori et al., 2007)

have been used in an attempt to decrease problem behaviors exhibited by students with disabilities in the classroom. While these behavior modification interventions did result in a decrease in problem behavior, researchers acknowledged that self-determination strategies such as self-monitoring were more effective (Restori et al., 2007) and offered increased contextual fit (e.g., Axelrod et al., 2009) within the classroom. In their study, Restori et al. (2007) found that typically developing students who engaged in disruptive behavior displayed an increased level of academic engagement and decreased level of disruptive behavior during the self-monitoring intervention phase compared to the DRO intervention phase.

Bruhn et al. (2015) described self-determination as an overarching term for a collection of interrelated skills, beliefs, and behaviors targeted to enhance quality of life by attaining autonomy across one's lifetime. Konrad et al. (2007) identified that the level of self-determination in students with disabilities is a significant predictor of future positive outcomes. With this, several subcategories fall under this term, one of which is referred to as self-management/regulation (Wehmeyer & Field, 2007). Self-management can be defined as the implementation of self-directed behavior strategies to alter behaviors in a preferred direction (Cooper et al., 2020). Essential strategies used in self-management/regulation include self-monitoring, self-evaluation, self-regulated strategy development, self-instruction, and goal setting (Niesyn, 2009). Self-monitoring involves the process of self-observation and self-recording. Self-observation can be described as the students' ability to pay attention to a particular feature of their behavior and distinguish whether or not that particular behavior has occurred (Amato-Zech et al., 2006). Goal setting has been labeled as a foundational component in self-regulation and behavior change (Schippers et al., 2020) and stipulates the conditions

necessary to attain personal success by prompting an individual to engage in self-monitoring and self-judgements of performance achievements (Bandura, 1991).

In an effort to ameliorate the difficulties faced by students with behavior and learning disorders, Palmer and Wehmeyer (2003) acknowledged the growing recognition toward teaching self-determination skills to students early within their educational career. In their study, they found that children as young as 5-years-old have the ability to engage in self-determination strategies, such as goal setting, with the help of caregivers. Schunk (1983) demonstrated that children who self-recorded (i.e., self-monitored) engaged in 129% higher skill level and 65% more persistence with on-task behavior compared to students who did not self-record. Schunk (1983) demonstrated that by systematically recording and observing the progress of one's own learning, student learning was enhanced. By learning how to engage in self-management strategies at an early age, students might be better equipped to contact academic success by engaging in self-judgement and to adequately advocate for themselves within their yearly individual education plan (IEP) meetings (Palmer & Wehmeyer, 2003).

Schippers et al. (2020) noted that the correlation between goal setting interventions and academic success can be seen across a multitude of cultures and populations. However, goal setting is extremely important for students struggling to contact academic success and has been recognized as a formidable intervention to promote academic achievement (e.g., Dotson, 2016; Morisano et al., 2010) and problem behavior reduction (e.g., Lochman et al., 1984). However, research has shown that the application of interventions that promote self-determination skills are frequently disregarded within the classroom by reason of time constraints and apprehensions that doing so will be a detriment to academic skill instruction (Konrad et al., 2007; Moeller et al., 2012; Wehmeyer et al., 2000). Research has indicated that with proper implementation of goal

setting and self-monitoring within the classroom, students will display enhanced performance, while correspondingly learning necessary skills, such as on-task behavior, to maintain desired academic behavior (e.g., Axelrod et al., 2009; Dotson, 2016; Moeller et al., 2011; Slattery et al., 2016). Therefore, the use of behavioral interventions that incorporate self-monitoring and goal setting, are more likely to emphasize generalization and maintenance of skills over time compared to interventions that are implemented by another individual, due to the absence of an external change agent (Freeman & Dexter-Mazza, 2004). Evidently, due to the obstacles educators face, it is essential that interventions that involve goal setting and self-monitoring are easily incorporated into the academic curriculum (i.e., demonstrate contextual fit) to ensure high rates of treatment fidelity and emphasize optimal effects (Axelrod et al., 2009; Estrapala et al., 2018).

Most studies that have assessed the effectiveness of self-monitoring interventions within the classroom have incorporated the use of an audible prompt to evoke students' self-observation of the target behavior (e.g., Axelrod et al., 2009; Freeman & Mazza, 2004). Amato-Zech et al. (2006) and Moore et al. (2013) used the MotivAider to demonstrate that tactile prompts are also an effective method to elicit self-monitoring behavior of students within the classroom environment. The MotivAider provided tactile prompts for students to engage in self-observation within a self-monitoring intervention and resulted in an increase of on-task behavior for all participants (Amato-Zech et al., 2006; Moore et al., 2013). Evidently, using audible and tactile prompts within self-monitoring interventions have shown to be equally useful.

Bruhn et al. (2015) identified self-monitoring interventions as relatively unobtrusive and feasible within the school setting. To increase the feasibility of self-monitoring interventions in the classroom, Clemons et al. (2016) recommended that pre-existing resources should be chosen

for school-based interventions to prevent potential stigma correlated with obtrusive intervention delivery (e.g., a token economy system or use of a break card). Using an app such as I-Connect, which functions similar to a MotivAider, with capacities that offer tactile and/or audible prompts, capitalizes on such available resources, as a majority of students already have access to, or own a technological device such as a smartphone or tablet. Clemons et al. (2016) demonstrated that the I-Connect prompt within a self-monitoring intervention that included reinforcement was effective in increasing on-task behavior. Additionally, the authors noted that the I-Connect app had strong social validity for both participants and teachers. I-Connect was identified as an effective intervention for decreasing disruptive behavior while increasing task engagement within a general education classroom for an elementary school student diagnosed with ASD (Rosenbloom et al., 2016). To add, Rosenbloom et al. (2019) found that the use of the I-Connect application for a self-monitoring intervention for adolescents diagnosed with ASD, was effective in decreasing disruptive behavior and increasing both on-task and task completion behaviors. Crutchfield et al. (2015) implemented the I-Connect self-monitoring intervention with two middle school students who engaged in disruptive stereotypic behavior. The authors demonstrated a decrease in the participants' disruptive behavior as a result of the utilization of the I-Connect application. Consistent with these findings, Romans et al. (2020) demonstrated a significant improvement in all participants' on-task behavior as a result of a self-monitoring intervention that employed the use of the I-Connect application for high school students. Clemons et al. (2016) suggests that more research that incorporates technological advancements, such as the I-Connect app, is needed within the self-monitoring literature.

While Mooney et al. (2005) acknowledged the need for more research in high school and general education classrooms regarding self-monitoring interventions, Bruhn et al. (2015) noted

that this need within the literature has been met. Research specifically using I-Connect for both elementary and high school students is sparse, calling for further evaluation of the intervention with novel populations (e.g., students with different diagnosis such as EBD and in exclusionary classrooms). To add, research has continued to implement self-monitoring interventions that utilize a small range of intervals for self-recording (e.g., Clemons et al, 2016; Moore et al., 2013), limiting the contextual fit of such interventions within the classroom environment. Axelrod and colleagues (2009) provided evidence that there was no difference between levels of on-task behavior between differing intervals of self-recording. Therefore, the purpose of the current study was to replicate and extend the findings from Clemons et al. (2016) by examining the use of self-monitoring via the I-Connect app and reinforcement, to improve the on-task behavior of upper-level elementary school students with EBD or at risk for EBD. Additionally, this study assessed the effectiveness of the I-Connect app by increasing self-monitoring intervals from 30-s, previously used in Clemons et al. (2016), to longer intervals to promote enhanced contextual fit within the classroom setting. Clemons et al. (2016) measured student self-monitoring accuracy by comparing researcher ratings to that of the students; an additional purpose of this study was to extend these findings by measuring student self-monitoring accuracy to that of the teachers' rating, to foster continued use of the intervention following the completion of this study.

CHAPTER 2:

METHOD

Participant and Setting

Prior to participant recruitment, school district institutional review board (IRB) and university IRB approval was obtained. Student participants were included if they were identified with an emotional behavior disorder (EBD) or were at risk for an EBD due to problem behaviors that were occurring within their self-contained classroom, as demonstrated in their IEPs and teacher reported challenges with the student's on-task sustainability. Participants were considered for this study if they displayed some form of off-task behavior that inhibited academic performance, leaving them at risk for retention. Students with severe problem behavior were excluded from the study. In addition, students with chronic absences (greater than six in the past calendar month) were excluded. Following identification of eligibility by their teacher and unit behavior specialist, guardian consent and student assent were obtained.

Three student participants were included in this study. Participant names are represented as pseudonyms. Participant 1, Cayson, was an 11-year-old Caucasian male student in 5th grade. Cayson was diagnosed with a language and speech impairment, specific learning disability, ADHD, disruptive mood dysregulation disorder and was identified as being at risk for an emotional behavior disorder. Cayson was referred for this study due to consistent task refusal and disruptive off-task behavior throughout the entirety of the school day. Participant 2, Juan, was a 10-year-old Hispanic male student in 4th grade. Juan had a diagnosis of EBD and ADHD. Juan was recommended for participation in this study due to low task completion and disruptive

off-task behavior that occurred throughout the entirety of the school day. Participant 3, Michael, was an 11-year-old Caucasian male student in 5th grade. Michael was diagnosed with EBD, interpersonal relationship disorder, impulse control disorder, explosive disorder intermittent type, oppositional defiant disorder (ODD) and ADHD. Michael was identified as a candidate for this study due to disruptive off-task behavior throughout the duration of the school day. All three students were in the same self-contained exceptional student education (ESE) classroom at a public elementary school in Florida which served students in the 4th and 5th grade. There was a total of 12 students in the classroom, along with the teacher and two instructional assistants (IA). All students remained in the same ESE classroom for the duration of the school day with the exception of recess and extracurricular periods (e.g., art, physical education and music). The classroom had five tables and four individual desks that were assigned to each student. Students were provided with either stable four-legged chairs or rocking chairs based on their personal preference. Each IA and teacher had their own round table that functioned as an alternative place for students to sit, engage in work tasks or receive extra assistance or redirection. In the back corner of the room, there was a designated area for students to de-escalate or take a break from the instruction period. Students in this classroom had IEP's and exhibited problem behavior consistent with those behaviors associated with an emotional behavior disorder.

The main teacher for this classroom participated in this study. The teacher was a 69-year-old Caucasian male working in the school district for 12-years. Inclusion for participating in this study was based on his willingness to receive training and implement the I-Connect application with the students in his classroom.

Materials

Similar to the materials used in Clemons et al. (2016), a reinforcer menu, WiFi enabled technology device (e.g., a smartphone or a tablet) and the I-Connect application were used in this study. Additionally, the MultiTimer application installed on an iPhone was used to collect duration data. The MultiTimer application permitted various timers to be set simultaneously, allowing for a "countdown timer" (i.e., interval timer) and a "count up timer" (i.e., duration timer) to be used at the same time. A reinforcement menu was created for each student following a preference assessment using a word processor software program that displayed a hierarchy of 10 preferred items in the form of picture icons (Clemons et al., 2016), for each participant. The I-Connect application allowed the participants to monitor their behavior and was downloaded on the smartphones and/or tablets owned by the observers. An iPad was provided to the participants by the researcher that enabled the "guided access" feature that allowed the participants to view only the I-Connect screen. The guided access feature requires a password to exit out of the screen, which only the researcher had access to. Similar to Clemons et al. (2016), the self-monitoring of on-task behavior was used in the present study, although the I-Connect application offers various self-monitoring capacities (e.g., attendance, homework completion). The prompt appeared on the teacher's and participants' WiFi enabled device screens simultaneously following the completion of the particular interval, along with a chime sound (See Appendix A for screenshots of the I-Connect application).

Target Behavior and Data Collection

The primary dependent variable in this study was the total duration of on-task behavior and the percentage of intervals on-task over the course of one instructional class period. On-task behavior was defined as any time the student attended to and engaged with the class materials

and/or teacher, sat upright at their desk with limited motor movement, accurately completed work during independent tasks, remained quiet during instructional or independent work time, ignored other peers' disruptions, did not engage with their peers unless directed to do so or permission was provided by the teacher or IAs, and made comments and/or answered/asked questions relevant to the instructional material. Any instance in which on-task behavior was not present was considered off-task behavior.

Observation procedures for this study were replicated based on the procedures used in Clemons et al. (2016). The teacher collected data using a momentary time-sampling recording procedure throughout one instructional class period for each participant as provided by the prompts on the I-Connect application. If the student was engaged in on-task behavior at the end of the interval, the teacher responded "yes" to the I-Connect prompt. Conversely, if the student was not engaged in on-task behavior at the end of the interval, the teacher responded "no" to the I-Connect prompt. Additionally, the researcher used a datasheet to score on- or off-task behavior as occurring for each 5-min interval using momentary time sampling simultaneously with the teacher and student. The researcher also recorded the total duration in which each student was engaged in on-task behavior throughout the 30-min instructional period.

Interobserver Agreement (IOA)

To calculate interobserver agreement (IOA), two observers (i.e., the researcher and research assistant) independently recorded the duration of on-task behavior that each participant engaged in throughout the instructional period and used momentary time sampling with 5-min intervals to record the presence of on- or off-task behavior. A thorough definition of on-task behavior was provided to each observer to allow for an unambiguous understanding of what the topography of the behavior did and did not look like. Similar to the IOA training conducted in

Clemons et al. (2016), the two observers viewed video recordings of observational sessions found on YouTube and recorded duration of on-task behavior. Upon 90% agreement between the observers, IOA was calculated for all participants across phases. IOA for percentage of intervals on-task was calculated by the total number of agreements divided by total number of agreements plus disagreements. IOA for duration was calculated by converting each duration number into seconds and dividing smaller duration by the larger duration for each session and multiplied by 100.

IOA was calculated for 33% of sessions for Juan and Michael and 25% of sessions for Cayson across baseline and intervention phases. IOA for percentage of intervals on-task was 100% across all participants during each session. Average IOA for duration for Cayson was 100%, with a range of 100% to 99.5%. Average duration IOA for Juan was 99.4%, with a range of 100% to 99.6%. Average duration IOA for Michael was 96%, with a range of 100% to 84.5%.

Treatment Integrity

Treatment integrity (TI) data was scored based on accurate implementation of each step within the intervention. Additionally, the consequences that followed the participants' attainment of each self-monitoring goal were also scored (See Appendix B). The percentage of TI was calculated by dividing the number of steps engaged in correctly by the total number of steps in the implementation of the intervention and then multiplying by 100. TI data was collected by the IOA observer for 25%, 28% and 50% of intervention sessions for Cayson, Juan and Michael, respectively. TI was always 100% with all participants.

Social Validity Assessment

The social validity and consumer satisfaction rating scales for the I-Connect self-monitoring application used in the study conducted by Clemons et al. (2016) were also used to assess the acceptance of this study and procedures by students and teachers (See Appendix C). The teacher rated student productivity in class, assignment completion, grade, and accuracy of work using a 5-point Likert-type scale (Clemons et al., 2016). The three students completed a rating scale similar to the scale previously mentioned that allowed them to evaluate their classroom performance in the areas of work completion, grade, performance on classwork and attention during lectures and classwork (Clemons et al., 2016). The 5-point rankings used in each rating scale ranged from 1 being *no improvement noted* to 5 being *great improvement*.

Experimental Design

A non-concurrent multiple baseline across participants design was used to examine the effect of the self-monitoring application and reinforcement on the reduction of off-task behavior exhibited by each participant.

Procedures

All data were collected in the morning prior to lunch for each student. The teacher indicated that all three students engaged in off-task behavior across the entire day and that there was not one particular class period that was more difficult. This was concurred based on observations by the researcher during the morning class periods. Therefore, data was collected throughout the morning which consisted of math, language arts, science, social studies, and vocabulary. Throughout all baseline and intervention sessions, each participant was observed in the classroom for 30-min during the morning classes. Fixed self-monitoring intervals of 5-min were used for all sessions in baseline and intervention conditions for all participants.

Prior to baseline data collection the researcher was present in the classroom for one week to reduce the likelihood of reactivity once data collection started. The students in the class were told that the researcher was observing the teacher.

Baseline

The teacher was instructed to conduct class and respond to each students' behavior as he normally would. Examples of typical responses to problem behavior by the teacher included vocal redirection to the task, relocation of the student away from a peer or to a closer proximity to a classroom adult or a reduction in points within the class wide level system.

Preference Assessment

All three students had a strong verbal repertoire, therefore preference assessment data was collected through the use of an open-ended questionnaire in which the students marked items they preferred from a list of possible reinforcers that the teacher indicated would be feasible for his classroom. Options of activities such as breaks, a good note home, time on the iPad or computer, and items such as candy, chips, or a juice box were listed on the questionnaire for the students to choose as a potential reinforcer. The students also had the opportunity to specify and/or list additional items they wanted to receive upon attaining their goal within the questionnaire. Following the completion of the questionnaire, a reinforcer menu was created for each student by selecting ten of the identified preferred items from the list that the teacher indicated were most feasible to deliver in the classroom.

I-Connect Training

The I-Connect training was adapted from the training that was implemented in Clemons et al. (2016). I-Connect training consisted of three separate training sessions that occurred in one

day for a total training time of 30-min. All training sessions were provided in a 1:1 setting with the researcher using behavior skills training (BST; Miltenberger et al., 2004). The teacher was trained prior to baseline for all participants, as he was required to respond to the I-Connect prompts during all phases of this study. Each student was trained individually, in a staggered fashion, as they each entered the first intervention phase.

I-Connect Teacher Training Throughout Training Session 1, direct instruction and modeling were used to explain the topography of on-task behavior. The teacher was provided with examples of the student engaging in on-task behavior (e.g., student engaged in their work, student looking at the teacher during instruction, and writing answers to a worksheet) and examples of off-task behavior (e.g., looking around the classroom, conversing with peers, tapping school supplies on a desk). Following on- and off-task behavior explanation, the researcher reviewed what momentary time-sampling was and how it was used. The researcher and the observer viewed three different videos of a student engaging in various on- and off-task behaviors (obtained from YouTube). Using a paper and pencil data collection system, the teacher scored the presence or non-presence of on-task behavior using momentary time sampling with 20-s intervals. In order to conclude Training Session 1, the teacher had to accurately identify on-task behavior for five consecutive trials (Clemons et al., 2016).

Training Session 2 consisted of teaching on the use of the I-Connect application. First, the teacher was instructed on how to start and navigate the I-Connect self-monitoring program. The researcher modeled this step and offered the teacher the opportunity to rehearse the skill with the use of verbal prompts. Following accurate completion of turning on and navigating through the program, the teacher was presented with the same three video recordings from Session 1 (Clemons et al., 2016). The teacher monitored student behavior from the video just as

he would during an intervention session. To decrease the amount of training time, the teacher practiced responding to the I-Connect prompts using 10-s intervals. The researcher monitored his responses and provided praise for accurate recordings and corrective feedback for inaccurate recordings of student on-task behavior. In order for Training Session 2 to conclude, the teacher was required to correctly score student on-task behavior for a minimum of five consecutive intervals (Clemons et al., 2016).

Training Session 3 consisted of teacher use of the application during a mock intervention session. During this time, the researcher took the role of the student while the teacher recorded the hypothetical student's behavior for a session that is typical to that of an instructional class period using the I-Connect application. The researcher provided feedback based on the teacher's performance during the observation and the accuracy of his scoring. In order to conclude training, the teacher was required to exhibit the skills necessary to turn on the device and navigate to the I-Connect program and accurately monitor student behavior with the application for a minimum of five intervals during the session (Clemons et al., 2016).

I-Connect Student Training The same procedures that were adapted from Clemons et al. (2016) used to train the teacher on the use of the I-Connect application in this study, were used to train the student participants. For Training Session 1, the researcher provided direct instruction and modeling of the topography of on-task behavior using examples and nonexamples. The researcher asked the students to provide their own examples of what they considered on- and off-task behavior. The researcher provided the student with video recordings of other students engaging in on and off-task behavior. The behaviors on the video recordings were similar to the topography of the on- and off-task behavior the participant exhibited during baseline. The researcher paused the video and asked the student to identify if the behavior exhibited by the

student in the recording would be considered on-task at that time. Following accurate identification of on-task behavior for five consecutive presentations of the behaviors, Training Session 1 was concluded (Clemons et al., 2016).

Training Session 2 consisted of the use of the I-Connect application, using the same protocol that was used to train the teacher on the use of the program. Students were taught to respond to the app during this training session. Upon the presentation of the prompt provided by the I-Connect application, students were expected to respond "yes" or "no" if the student in the video was on- or off-task. If the student accurately scored the behavior as being on-task, the researcher provided praise. If the student incorrectly recorded the behavior as being on-task, the researcher provided error correction in the form of descriptive feedback. Upon five consecutive intervals with accurate scoring, Training Session 2 concluded. Subsequent to training, the participant used I-Connect in a mock intervention session, similar to that of the teacher training (Clemons et al., 2016).

Training Session 3 was the same as that of the third training session that occurred during the teacher training.

Intervention

Following the conclusion of training for the I-Connect self-monitoring application, the intervention was implemented in the classroom. Self-monitoring and reinforcement were the two components of the intervention. The researcher prepared the I-Connect application for the student prior to the start of the session, while the teacher was responsible for preparing the I-Connect application on his mobile device. The researcher and the teacher simultaneously clicked "start" on the self-monitoring timer to begin the data collection session. Once the timer was set

on the student's I-Connect monitor, the researcher immediately placed the iPad on their desk/table and reminded the student to respond to the prompts honestly. The duration timer began upon the first instance of on-task behavior in the session. Each participant monitored their on-task behavior for six, 5-min intervals (30-min total). The determination of the interval used for each participant to engage in self-monitoring was determined based on the feasibility for the teacher, as he identified the desired interval for the class period. The I-Connect application prompted the students at the end of each 5-min interval with the question, "Are you on-task?" and presented the student with the option of "yes" or "no" (Clemons et al., 2016). The teacher also responded to the prompt, "Is (student's name) on task?" provided by the I-Connect application on his own device at the end of each 5-min interval. The teacher responded to this prompt by clicking "yes" or "no."

Similar to the intervention procedure used in Clemons et al. (2016), students selected an item from their individualized reinforcement menus prior to the start of the session. Selection of a preferred item or activity prior to the start of the session acted as a goal for the students to meet by staying on-task. Initially, students who solely engaged in a minimum of 80% accurate matches to that of teacher ratings received their chosen reinforcer. Following the completion of the 30-min session, the researcher met briefly with the student to review the data obtained from the I-Connect application, calculated the total number of matching intervals between the teacher and student, and discussed the results with the student. If teacher absences occurred, the students' rating was compared to that of the researcher and all other procedures remained the same. This occurred four times within intervention phases of the study.

By providing the reinforcer for accurate matches only during the first intervention phase, it allowed students to contact the reinforcement contingency (i.e., scoring their behavior

correctly resulted in access to a reinforcer). Following three consecutive days of accurate matches between the student's and teacher's on-task behavior rating (Intervention Phase 1), reinforcement continued to be contingent on the student having a minimum of 80% accurate matching with the teacher plus the student also had to be engaged in on-task behavior for a minimum of 80% of intervals throughout the instructional period (Intervention Phase 2). Like Clemons et al. (2016), reinforcement was only provided to the student upon meeting the dual criteria discussed above.

CHAPTER THREE:

RESULTS

The data obtained from this study indicated that the use of the I-Connect self-monitoring application and reinforcement resulted in increased on-task behavior for all participants. Figure 1 represents duration data collected by the researcher and shows increases in the duration of on-task behavior with the implementation of Intervention Phase 1 and some additional increases in Intervention Phase 2. Figure 2 represents the corresponding matches between student and teacher rating and the presence of on-task behavior at the end of each 5-min interval across phases using momentary time sampling.

Cayson

In baseline, Cayson's duration of on-task behavior averaged 11-min (range=6-to 14-min) with a downward trend. During Intervention Phase 1, Cayson's level of on-task behavior increased by almost double compared to baseline levels with an average of 26-min (range=24- to 26-min; See Figure 1). Cayson was on-task for 41.3% of intervals in baseline (range= 66% to 33%). Cayson was on-task for 83% percent of intervals and engaged in an average of 89% corresponding matches to his teacher (range=100% to 83%) in Intervention Phase 1 (See Figure 2). During phase 2, Cayson's duration level of on-task behavior remained similar to phase 1 with slight increases towards the end of the phase. His average duration of on-task during phase 2 was 27-min (range=24- to 29-min). He was on-task for an average of 91.5% of intervals (range=100% to 66%) and correspondingly matched his on-task behavior ratings to that of his teacher for a mean of 93.6% of intervals (range=100% to 66%; See Figure 2). Cayson identified

chips, Starbursts, juice boxes, 10-min of free time on the computer and listening to music for 10-min as preferred items to earn contingent on meeting intervention criteria.

Juan

Juan engaged in an average of on-task behavior for 9-min (range= 4- to 13-min) with a downward trend in baseline. In Intervention Phase 1, he engaged in an average duration of on-task behavior for 18-min (range=16- to 19-min) and an average of 22-min in phase 2 (range=16- to 26-min; See Figure 1). Juan engaged in an average of on-task behavior for 33.2% of intervals (range= 0% to 50%) in baseline with a downward trend. In phase 1, Juan engaged in an average of on-task behavior for 55.3% of intervals (range=66% to 50%) with corresponding matches to his teacher for an average of 94.3% of intervals (range=100% to 83%). In phase 2, Juan engaged in on-task behavior for an average of 81% of intervals (range=100% to 50%) and had corresponding matches to his teacher for an average of 86% of intervals (range=100% to 83%; See Figure 2). Juan identified chips, juice, access to iPad games for 10-min, receiving a good note home and working with a peer as preferred reinforcers to earn contingent on meeting intervention criteria.

Michael

Michael was on-task for an average of 11-min (range=5-to 16-min) in baseline with a stable trend. In Intervention Phase 1, Michael engaged in on-task behavior for an average of 27-min (range=27- to 28-min) and an average of 29-min in phase 2 (range= 29- to 28-min; See Figure 1). He engaged in on-task behavior for a mean of 43% of intervals (range=66% to 0%) in baseline. In phase 1, Michael was on-task for a mean of 94.3% of intervals (range= 100% to 83%) with an average of 94.3% corresponding matches to his teacher (range=100% to 83%). Michael was on-task and had corresponding behavior ratings to his teacher for an average of

96% of intervals in phase 2 (range=100% to 83%), similar to levels seen in Intervention Phase 1 (See Figure 2). Michael identified Kit-Kats, juice boxes, 10-min of free time on the computer and working with a peer as preferred reinforcers to earn contingent on meeting intervention criteria.

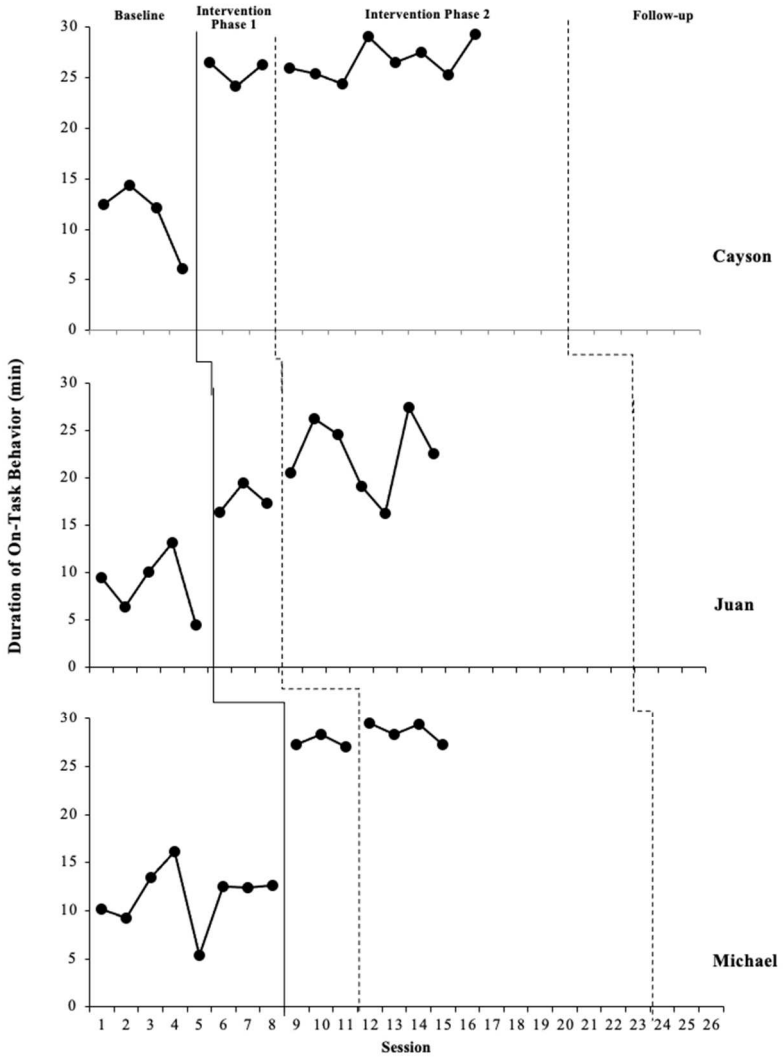

Figure 1. This graph represents data obtained from Cayson, Juan and Michael following the various intervention phases from researcher recorded data on duration of on-task behavior.

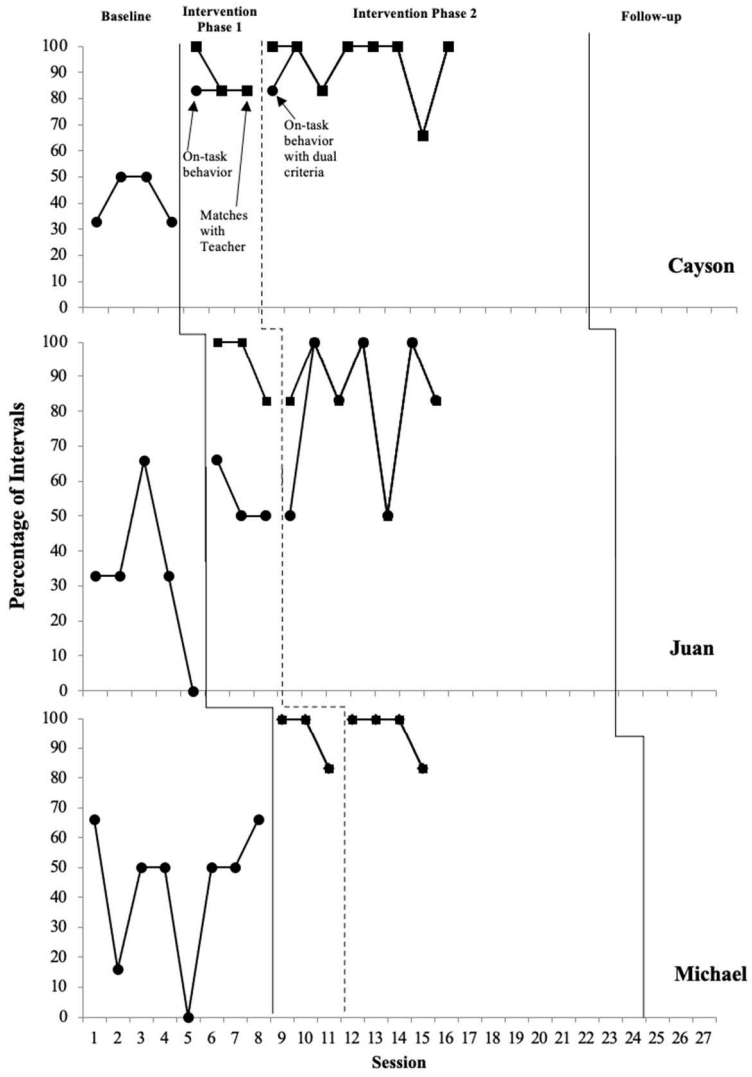

Figure 2. This graph represents data obtained from participants 1, 2 and 3 following the various intervention phases from teacher recorded on-task behavior using percentage of intervals.

CHAPTER 4

DISCUSSION

This study aimed to replicate and extend the findings from Clemons et al. (2016) by assessing the utility of the I-Connect self-monitoring application and reinforcement to increase on-task behavior of elementary-aged students with EBD or at risk for EBD. An additional goal of this study was to examine the effectiveness of using longer self-monitoring intervals from previously used 30-s intervals (Clemons et al., 2016) to 5-min intervals within 30-min sessions to promote enhanced contextual fit within a classroom environment. To promote continued use of the self-monitoring intervention following the conclusion of this study, student self-monitoring ratings were compared to that of their teacher. The data collected from this study indicated that the I-Connect self-monitoring intervention resulted in increased on-task behavior for all three student participants during both intervention phases compared to baseline levels.

This study extends self-monitoring literature and research using the I-Connect application in various, notable ways. Primarily, this study showed that the I-Connect self-monitoring application was effective with a different population, elementary school students with or at risk for EBD. As each participant was enrolled in a self-contained classroom for students with behavioral issues, the intervention resulted in increased levels of on-task behaviors for all three participants who initially engaged in low rates of on-task behavior prior to the start of the intervention. Second, this study supports the notion made by Axelrod et al. (2009), suggesting that increased self-monitoring intervals (i.e., 5-min) still allowed for increases in on-task behavior, despite the common use of short self-monitoring intervals (e.g., 30-s; Clemons et al.,

2016). Since 5-min self-monitoring intervals led to an increase in desired behavior in the classroom, as demonstrated in this study, this research offers support for increased contextual fit within the school environment. The teacher in this study was easily able to respond to the prompts provided by the application without straying away from the instructional lesson or causing distraction, further supporting contextual fit within the classroom.

Finally, this study adds to the growing support and acknowledgement of the use of technology-based interventions within the school system. As Clemons et al. (2016) noted, technologically based interventions can be more efficient, as they reduce the time spent on data collection and data entry. Moreover, technology-based interventions offer increased filing and information storage capacities, making the widespread use of the interventions more feasible (Clemons et al., 2016) and accessible. This study corroborates this implication as it provides further support on the effectiveness of the I-Connect application with a novel population.

Despite low baseline levels of on-task behavior for all participants, three noteworthy observations were made. First, there was an immediate increase in the duration of Cayson and Michael's on-task behavior upon the introduction of intervention phase 1. The length in which both participants remained on-task during the 30-min session almost doubled in time compared to their baseline averages. The participants were immediately able to accurately rate their behavior and remain on-task for a majority of the instructional period following the implementation of I-Connect. Next, although Juan's duration of on-task behavior upon the introduction of intervention phase 1 was not consistent with the other participants', it is still important to acknowledge that there was still an increase in duration of on-task behavior higher than baseline levels. Juan was able to accurately score his behavior compared to the teacher's rating to meet the criteria necessary to receive reinforcement in both phases. However, upon the

introduction of phase 2, Juan did not initially meet the dual criteria to receive reinforcement as his percentage of intervals on-task was below 80%. Following the first session in phase 2, Juan continued to meet both criteria to receive reinforcement. Finally, it is interesting to note that regardless of teacher and/or IA absence, addition of a new student, weekday, extended periods off from school (i.e., student absence and three-day weekends), and schoolwide extracurricular activities (e.g., book fair, character parade, Valentine's Day party) levels of on-task behavior remained stable for Cayson and Michael.

Limitations

Several limitations were present in the current study. First, phase changes were based on the data obtained from the duration measure collected by the researcher, as it was believed to be a more accurate representation of participant on-task behavior due to continuous measurement. Momentary time sampling can over or underestimate the occurrence of behavior when intervals are greater than 2-min (Cooper et al., 2020), hence why the duration measure was used for decision making. Second, teacher absenteeism throughout the duration of intervention implementation led to slight modifications within the delivery of reinforcement to the participants. When the teacher was absent, student ratings were compared to that of the researcher, instead of comparisons to teacher ratings. While it is not believed to have affected the results of the study, it is worth noting that there was a deferment from the originally described procedures when teacher absenteeism occurred. Teacher absenteeism occurred once during baseline and four times during intervention phases.

Third, there was extreme variability within the classroom schedule during baseline and intervention phases. While all data collection sessions were conducted within the first half of the students' day, session length, reinforcement requirements and all other components of the

intervention remained the same, subject periods and activities within the classroom varied. This occurred during both baseline and intervention phases. For example, the class may have earned free time during part of an observation or the participant completed an independent work task before their peers which resulted in free time. On-task behavior was scored as occurring during these times as long as the student remained in their area, was not disruptive to other students and was not engaging with their peers unless permission was provided by the teacher or instructional assistants. Simply stated, not all data was collected during strict instructional delivery. Due to classroom activity variability, this also explains why participants may have missed a prompt provided by the application. Participants were occasionally asked to hand out textbooks or worksheets, resulting in them being out of their seat and missing the opportunity to respond to the I-Connect prompt. The researcher and teacher still recorded this as the student being on-task. I-Connect does not currently offer the ability to view interval-by-interval responses to compare to another interval, and only displays the cumulative number of "yes" and "no" responses within their respective session. If the end of an interval occurred while the student was out of their seat with the permission of the teacher, the researcher noted it on their datasheet to use as a reference when student and teacher ratings were compared. If the student was identified as being on-task for 80% or more intervals per the comparison between the researcher and teacher ratings, reinforcement was provided. When comparing accuracy of student ratings, if the student was on-task but missed the prompt, this interval was not counted, and percentage of corresponding matches was compared to the teacher out of five intervals in place of the original six.

Finally, while tactile prompts do offer increased contextual fit within the classroom (Amato-Zech et al., 2016; Moore et al., 2013), an audible prompt was more feasible in the present study. The use of the audible prompt (i.e., the chime elicited by the I-Connect application

at the end of each interval) lessened the likelihood that the teacher and student would fail to respond to a prompt due to not seeing the screen flashing or feeling the device vibrate. As a result, the audible prompt was used within this study which could have been slightly distracting to other students within the classroom. As the audible prompt from the I-Connect application sounded like a commonly used text tone on the iPhone, some students looked up or made comments about phones not being allowed in school. Due to the nature of the ESE classroom however, these students are used to the presence of individualized interventions. The teacher briefly explained that it was not a cellular device and was part of an intervention. Redirection of these students to the original task occurred swiftly.

Future Research

The present study used the I-Connect application with a novel population (i.e., elementary school students with or at risk for EBD) to measure on-task behavior. Future studies could assess the use of I-Connect with older for students with EBD in middle and/or high school to increase task completion and/or task accuracy. While this study measured on-task behavior within a 30-min session, once per day, future research could also assess the use of the intervention throughout the entirety of the school day for high school students as they navigate through different class periods and locations throughout the school building. The use of the self-monitoring application might foster increased on-task behavior for students in all class periods, and eventually be systematically faded out upon reaching specified criteria. Additional studies might also assess the utility of the I-Connect application to implement the intervention class wide. This could improve the teachers' classroom management system and provide the opportunity for all students to work towards a group contingency reward.

I-Connect has been used to reduce disruptive behavior (e.g., Crutchfield et al., 2015; Rosenbloom et al., 2019) and increase task engagement (e.g., Clemons et al., 2016; Romans et al., 2020; Rosenbloom et al., 2019), task completion (Rosenbloom et al., 2020) and academic task accuracy (e.g., Romans et al., 2020) across elementary and high school students. I-Connect might also be useful in increasing class wide task completion, class attendance for high school students, or positive teacher-student interactions. The I-Connect application monitoring intervals can be set following a high school students' schedule as they change classes throughout the day. A prompt such as "Are you in your scheduled classroom?" can be provided to the student to self-monitor their schedule adherence and receive a reward for meeting a particular goal. If modifications to the app itself are made, students within a classroom can each respond to a prompt such as "Did you finish your work?" to increase attention to task completion. The teacher could review each of the students' ratings of their completed work and provide a contingent reward to the class upon meeting a specific criterion. Finally, I-Connect can be used to prompt teachers to acknowledge their own behavior and increase their rate of positive interactions with their students.

Upon the onset of the COVID-19 pandemic, technology has been relied on more than ever. The shift toward utilizing technology-based instruction and interventions within the school system has been made under the assumption that they will provide increased opportunities for students to problem solve, analyze information, communicate and utilize resources (Lim et al., 2013). Children are continually being exposed to technology earlier in life and are proficient in the utilization of these devices. Incorporating these devices in the classroom could result in improved engagement as shown in the current study. Technology-driven interventions that use self-monitoring could help practitioners and school personnel more easily obtain various types of

data on student behaviors, as data collection can be collected by the participant themselves without the consistent oversight of behavioral or school professionals. I-Connect has been shown to be effective and have strong social validity across the literature (e.g., Clemons et al., 2016; Rosenbloom et al., 2016). Contributing to the growing research, this study offered further support toward the use of technologically-based interventions to promote desired student behavior and can result in high levels of contextual fit within the school environment.

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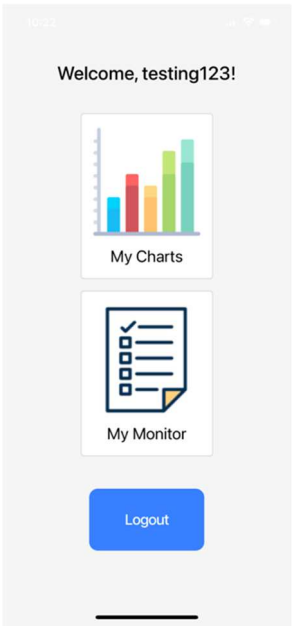
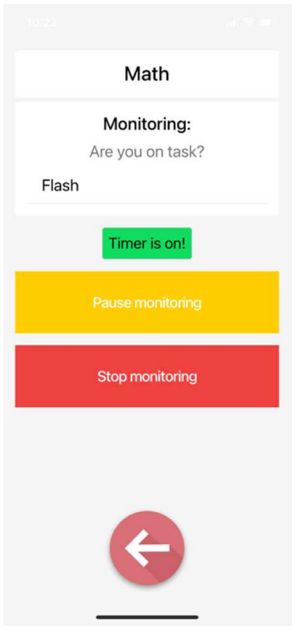
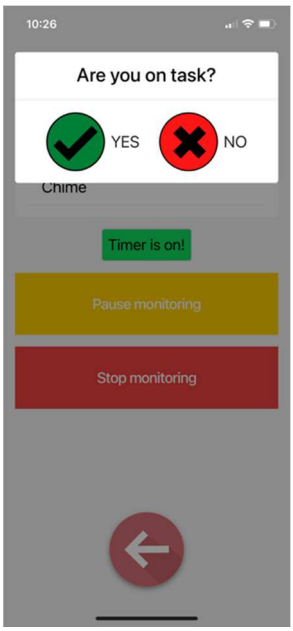
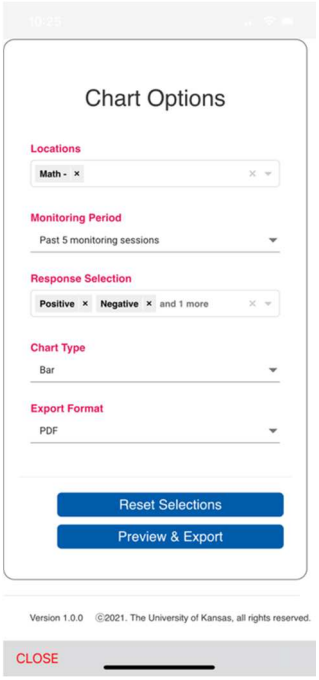
APPENDICES

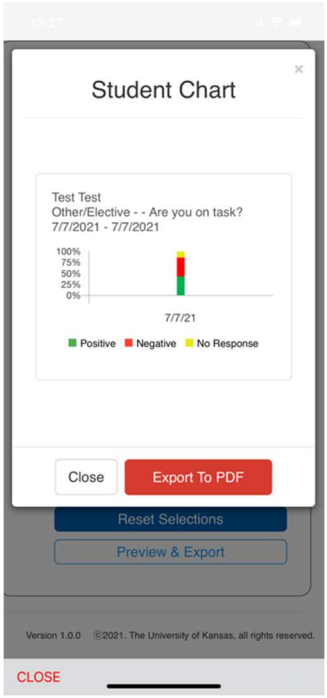
Appendix A: I-Connect Screenshots











Appendix B: Treatment Integrity

Treatment Integrity	
1. Obtains WiFi enabled device, logs into I-Connect prior to start of instructional period	Yes No N/A
2. Researcher shows student individualized reinforcer menu and asks what student wants to work for	Yes No N/A
3. Researcher reviews what is expected for student to receive reinforcement	Yes No N/A
4. Researcher starts MultiTimer, student I-Connect monitor and teacher monitor at the same time	Yes No N/A
5. Researcher starts and stops duration timer at each occurrence of on/off-task behavior throughout the 30-min interval	Yes No N/A
6. Teacher responds to each prompt (6) provided by I-Connect within 5-s within respective data collection session	Yes No N/A
7. Research marks +/- for presence/non-presence of on-task behavior at the end of each 5-min interval during data collection session	Yes No N/A
8. Researcher collects iPad from student at the end of the data collection system	Yes No N/A
9. Researcher compares student self-monitoring rating to that of teachers and themselves and correctly calculates percentage of matches between student and teacher	Yes No N/A
10. Researcher meets with student at end of class period	Yes No N/A
11. Researcher provides descriptive/corrective feedback regarding students' behavior	Yes No N/A
12. Researcher provides reinforcement contingent on 80+% of accurate matches (Phase 1 & 2) and 80+% of on task behavior (Phase 2)	Yes No N/A
# of steps engaged in correctly/total # of steps X 100 = Treatment Integrity: _____	

Appendix C: Social Validity

Teacher and Student Satisfaction Scale Results (Clemons et al., 2016).

Rating Scale Please circle the number to which you believe the I-Connect intervention applies to each question **1 = no improvement noted**				**5 = great improvement noted**	
Teacher Items					
Rate the extent to which I-Connect had a direct impact on the student's productivity in class	1	2	3	4	5
Rate the extent to which I-Connect had a direct impact on the student's assignment completion	1	2	3	4	5
Rate the extent to which I-Connect had a direct impact on the student's grade	1	2	3	4	5
Rate the extent to which I-Connect had a direct impact on the student's accuracy of work in class	1	2	3	4	5
Rate the extent to which I-Connect was easy to use during the instructional period	1	2	3	4	5
Rate the extent to which you would continue using I-Connect in the future	1	2	3	4	5
Rating Scale Please circle the number to which you believe the I-Connect intervention applies to each question **1 = no improvement noted**				**5 = great improvement noted**	
Student Items					
When using the I-Connect device, do you complete more work in class?	1	2	3	4	5
When using the I-Connect device, do you focus more on assignments and lectures?	1	2	3	4	5
When using the I-Connect device, do you have better grades?	1	2	3	4	5
When using the I-Connect device, do you earn more points on assignments worked on during class?	1	2	3	4	5

Appendix D: IRB Approval Letter

UNIVERSITY of SOUTH FLORIDA

APPROVAL

October 29, 2021

Marissa Del Vecchio
1512 E 12th Ave
UNIT 365
Tampa, FL 33605

Dear Ms. Marissa Del Vecchio:

On 10/29/2021, the IRB reviewed and approved the following protocol:

Application Type:	Initial Study
IRB ID:	STUDY003190
Review Type:	Expedited 7
Title:	The Impact of Self-Monitoring using I-Connect for Increasing On-Task Behavior for Students with an Emotional Behavioral Disorder
Approved Protocol and Consent(s)/Assent(s):	• Study Protocol; • Child Assent Form ; • Parent Permission Form ; • Teacher Consent Form; Approved study documents can be found under the 'Documents' tab in the main study workspace. Use the stamped consent found under the 'Last Finalized' column under the 'Documents' tab.

This study involving child participants falls under the minimal risk category 45 CFR 46.404: Research not involving greater than minimal risk.

Requirements for Assent and/or Permission by Parents or Guardians: 45 CFR 46.408 Permission of one parent is sufficient. Assent will be obtained as outlined in the IRB application.

UNIVERSITY of SOUTH FLORIDA

Within 30 days of the anniversary date of study approval, confirm your research is ongoing by clicking Confirm Ongoing Research in BullsIRB, or if your research is complete, submit a study closure request in BullsIRB by clicking Create Modification/CR.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

Jennifer Walker
IRB Research Compliance Administrator