A Single-Case Study of a Self-Monitoring Intervention for High School Students

BY

SKIP KUMM
B.S., The University of Dubuque, 2006
M.A.T, National-Louis University, 2011

THESIS

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Special Education
in the Graduate College of the
University of Illinois at Chicago, 2019

Chicago, Illinois

Committee:

Dr. Elizabeth Talbott, Chair and Advisor
Dr. Daniel Maggin
Dr. Lisa Cushing
Dr. Sunyoung Kim
Dr. Kristine Jolivette, University of Alabama

ACKNOWLEDGMENTS

Thank you to all of the people that provided me with never-ending support throughout my doctoral journey. To my advisor and committee chair, Dr. Elizabeth Talbott, thank you for your guidance, expertise, and patience throughout this process. I will forever be grateful for all of the support that you have provided me over the past four years. Thank you to my committee members, Dr. Daniel Maggin, Dr. Kristine Jolivette, Dr. Lisa Cushing, and Dr. Sunyoung Kim, for your feedback and guidance throughout my dissertation. I would also like to thank Dr. Marie Tejero Hughes for providing me with guidance and numerous opportunities to learn and grow as a doctoral student.

I would also like to thank all of my fellow doctoral students that helped me grow and learn over the past four years. I owe everything to my cohort: Christerralyn Brown, Gina Braun, and Sam Walte. You three are amazing, and I could not imagine going through this journey without you. Lastly, I would like to thank all of the scholars with the National Center for Leadership in Intensive Interventions for pushing me to be a better scholar and providing support to grow and learn.

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LIST OF ABBREVIATIONS

ADHD   Attention-Deficit/Hyperactivity Disorder

AE   Academic Engagement

CBT   Cognitive Behavioral Therapy

CD   Conduct Disorder

CURP   Children's Usage Profile Rating

DB   Disruptive Behavior

DBI   Data-Based Individualization

DV   Dependent Variable

EBD   Emotional and Behavioral Disorder

ED   Emotional Disturbance

FAST   Functional Assessment Screening Tool

IEP   Individualized Education Program

IOA   Interobserver Agreement

IRD   Improvement Rate Difference

IRP-15   Intervention Rating Profile - 15

LD   Learning Disability

LRR   Log Response Ratio

MBL   Multiple Baseline

PBIS   Positive Behavioral Interventions and Supports

PND   Percentage of Nonoverlapping Data

SEL   Social and Emotional Learning

SDQ   Strengths and Difficulties Questionnaire

LIST OF ABBREVIATIONS (continued)

SLD   Specific Learning Disability

SMD   Standardized Mean Difference

URP-IR Usage Rating Profile – Intervention, Revised

WWC   What Works Clearinghouse

SUMMARY

Students with high incidence disabilities who display elevated levels of externalizing behaviors are more likely to obtain lower grades, less likely to pass classes, and less likely to have positive peer and adult relationships compared to their peers with and without disabilities (Lane, Barton-Arwood, Nelson, & Wehby, 2008; Maggin, Wehby, & Gilmour, 2016). Furthermore, students who display elevated levels of externalizing behaviors are likely to display actions that negatively affect both their academic and behavioral outcomes in the classroom (Maggin et al., 2016). Teachers are expected to deliver evidence-based interventions in their classrooms to improve these outcomes (Every Student Succeeds Act, 2015), but teachers cite high-frequency, low-intensity disruptive behavior as an ongoing challenge, and they can struggle to deliver evidence-based behavioral interventions in their classrooms (Barrett, Eber, & Weist, 2013; Busacca, Anderson, & Moore, 2015; Wehby & Kern, 2014). Self-monitoring is an evidence-based intervention that has over 40 years of research demonstrating effectiveness at improving on-task behavior and decreasing disruptive behavior for students with high incidence disabilities who also display elevated levels of externalizing behaviors (e.g., Dooley, 2018; Vogelgesang, Bruhn, Coghill-Behrends, Kern, & Troughton, 2016). At its core, self-monitoring involves students observing and recording their behavior at regular intervals, and self-monitoring interventions often include additional components, such as adult feedback, graphing, technology, and contingent reinforcement (Bruhn, McDaniel, & Kreigh, 2015). Although there is sufficient research to identify self-monitoring as an evidence-based intervention (Busacca et al., 2015; Maggin, Briesch, & Chafouleas, 2013), researchers have most often implemented self-monitoring interventions with students in grades K-8, and there is a paucity of research on the efficacy of self-monitoring for high school students with high incidence disabilities.

SUMMARY (continued)

The purpose of this study was to examine whether an electronic (MoBeGo) self-monitoring intervention was effective for high school students with high incidence disabilities who also displayed elevated levels of externalizing behavior. In this study, I recruited two general education high school teachers who taught students with individualized education programs for high incidence disabilities who also displayed elevated levels of externalizing behaviors at school. To identify students who met the inclusion criteria, the two teachers nominated students and then completed the *Strengths and Difficulties Questionnaire (*SDQ; Goodman, 1997*)* to assess whether the students displayed the externalizing behavior in class. I then conducted two direct observations to confirm that the nominated students displayed the behaviors in class. A total of four high school students with high incidence disabilities met the inclusion criteria and participated in this study, and I implemented a single-case withdrawal (ABAB) research design with each student to assess the functional relation between the electronic (MoBeGo) self-monitoring intervention, and the dependent variables of academic engagement and respectful behavior. To collect data on the dependent variables, I conducted direct observations utilizing momentary time sampling at 15-second intervals for the duration of a class period. In the baseline and withdrawal phases (A), the student participants received the same classroom management strategies the teacher had used throughout the school year. In the intervention (B) phases, the students used the electronic (MoBeGo) self-monitoring application. MoBeGo was chosen to deliver the self-monitoring intervention because it has demonstrated positive effects in elementary and middle schools, and automatically incorporated goal setting and graphing in a digital format that did not require additional work from the teacher

SUMMARY (continued)

or students. Teachers met briefly with each student at the end of each class to review the results and discuss the student's performance.

I conducted a formative visual analysis within the phases of the study to monitor the students' performance and inform my decisions related to changing phases. The goal of the intervention was for students to improve the frequency with which they displayed academic engagement and respectful behavior by 10% from the baseline phase, and the participants were not eligible change phases until they had achieved goal and data were stable. I conducted summative visual analysis at the conclusion of the study to determine whether there was a functional relation between the electronic (MoBeGo) self-monitoring intervention and the dependent variables, and I also calculated effect sizes to analyze the degree of the change in the dependent variables. The visual analysis indicated that there was a functional relation between the intervention and the dependent variables of academic engagement and respectful behavior for three participants. A functional relation could not be determined for the fourth participant due to insufficient data in the final intervention phase. The results of the effect size analysis suggested that the intervention had a large effect on both dependent variables. Furthermore, the teachers and students were able to implement the intervention with fidelity and identified it as a socially valid intervention.

I. INTRODUCTION

Students with high incidence disabilities who also display elevated levels of externalizing behavior are not only at an increased risk for academic failure and behavior problems, but their behaviors may also disturb the learning environment for their peers (Griggs, Mikami, & Rimm-Kaufman, 2016). Therefore, teachers are increasingly required to collect and analyze data to implement proactive behavior management interventions to improve outcomes for students with high incidence disabilities who also display elevated levels of externalizing behavior (Simonsen, Myers, & Briere, 2011). However, teachers report that they often feel inadequately prepared to work with students who have externalizing behavior problems, and cite high-frequency, low-intensity disruptive behavior (e.g., speaking out of turn, not following directions, getting out of seat without permission), such as those typically displayed by students with elevated levels of externalizing behaviors, as among the biggest challenges they face in the classroom (Busacca, Anderson, & Moore 2015; Wehby & Kern, 2014). Due to these challenges, students with high incidence disabilities who also display elevated levels of externalizing behavior problems often experience poor academic and post-secondary outcomes (e.g., lower income, contact with the correctional system; Vaughn et al., 2011) and students with high rates of aggressive behaviors and low levels of academic performance are the most likely to drop out of high school (Cairns, Cairns, & Neckerman, 1989). The term high incidence disabilities include students labelled with an emotional disturbance (ED), learning disabilities (LD), and attention-deficit/hyperactivity disorder (ADHD; Gage, Lierheimer, & Goran, 2012). According to researchers with the National Longitudinal Transition Study-2, students with severe externalizing behavior problems experienced less favorable outcomes compared to their peers that are identified with other disabilities and were more likely to fail a grade or be expelled from school (Wagner & Newman,

2012). When compared to their peers receiving special education services, students with high incidence disabilities who also display elevated levels of externalizing behaviors were more likely to fail courses and perform in the lowest quartile academically (Kern et al., 2017; McDaniel, Bruhn, & Troughton, 2017). Students with elevated levels of externalizing behaviors are also more likely to engage in negative social interactions with their peers, which can lead to feelings of isolation and can result in increased levels of depression or anxiety (Harrell, Mercer, & DeRosier, 2009). They are more likely than their peers with disabilities to be placed in alternative education settings (Turton, Umbreit, & Mathur, 2011). Upon leaving school, students with externalizing behaviors are more likely to experience unemployment and be arrested within four years of leaving school (Newman, Wagner, Cameto, Knokey, & Shaver, 2010). Even though researchers and educators have worked hard to improve outcomes for students displaying externalizing behavior, these students are still experiencing negative academic and post-secondary outcomes (Vaughn et al., 2011).

Characteristics of Students with High Incidence Disabilities and Elevated Levels of Externalizing Behaviors

Olson and colleagues (2013) stated, "the term 'externalizing problems' has been a useful summary variable for a heterogeneous cluster of behaviors encompassing individual differences in children's physical aggression, oppositional behavior, covert aggression, emotion dysregulation, impulsive/overactive behavior, and rule-breaking behavior" (Olson et al., 2013, p. 817). Aggregating these related constructs under the term of externalizing behavior may be more predictive of student behaviors than trying to isolate them separately (Olson et al., 2013). Furthermore, the *Diagnostic and Statistical Manual of Mental Disorders* 5th ed. (DSM-5; American Psychiatric Association, 2013) clusters child and adolescent mental health problems as

either externalizing or internalizing (American Psychiatric Association, p. 13). To examine externalizing behaviors of students, Olson and colleagues (2013) described the following five sub-dimensions of externalizing behaviors: a) oppositional defiant behavior, b) overt aggression, c) covert aggression, d) impulsivity/inattention, and d) emotion dysregulation, which they extracted from the *Child Behavior Checklist* (Achenbach & Rescorla, 2001), a widely used measure of students externalizing behaviors. Olson and colleagues (2013) described oppositional behaviors as when a student argues, does not comply with a request, or displays other behaviors to avoid a request from an adult. They defined overt aggression as the types of behaviors that adults can typically observe, such as pushing, kicking, or shoving, and covert aggression as behaviors that are more difficult for adults to observe, such as stealing, cheating, or lying. Inattention was described as behaviors that result in a student not paying attention to academic or other school related activities. Lastly, they described students with emotion dysregulation as being unable to control their emotions, which can result in moodiness, irritability, or outbursts. Olson and colleagues (2013) also stated that many of the five subscales were similar, and all may result in students experiencing disruptive behavior in school and missing academic instruction. The definitions by Olson and colleagues (2013) highlight the ways in which students' behavior is likely to disturb their learning and the learning of their peers. Therefore, to improve educational and behavioral outcomes for students with elevated levels of externalizing behaviors, educators need to provide individualized interventions (Wehby & Kern, 2014).

Academic and Behavioral Needs of Students with High Incidence Disabilities and Elevated Levels of Externalizing Behavior

Researchers at the National Research Council and Institute of Medicine (2009) identify that 14% to 20% of youth display symptoms of emotional or behavioral disorders at some point

during in their academic career; however, only 1% of students receive the label of emotional and behavioral disorder (EBD) in education, which allows them to receive special education services and interventions (Kutash, Ducknowski, & Lynn, 2006). Youth who are identified with EBD are likely to have high levels of externalizing behaviors, which may affect their educational outcomes (Lane, Barton-Arwood, Nelson, & Wehby, 2008). In a study of students classified as having a high incidence disability, Gage and colleagues (2012) examined characteristics across high incidence disability categories and found that students had similar cognitive and academic outcomes across disability categories, but students classified with ED displayed higher rates of behavior problems. Additionally, students with elevated levels of externalizing behaviors may be misidentified or otherwise not receive special education services but display behaviors similar to students labled with ED and are likely to experience similar educational and post-secondary outcomes (Lane et al., 2018). For instance, students identified with ED have the lowest graduation rate among all students with disabilities (U. S. Department of Education, Institute of Education Sciences, 2005). Longitudinal transition data document that students with ED have experienced poorer post-secondary outcomes and higher rates of criminal involvement than their peers in the general population and compared to all other youth with disabilities (Wagner & Newman, 2012). The long-term effects of not graduating from high school are numerous; for example, students without a high school diploma only earn 73% as much as high school graduates and are much more likely to be unemployed (U. S. Department of Labor, Bureau of Labor Statistics, 2015). It is also important to note that the label of ED is an administrative label, which is different from state to state (Sullivan, 2017). As a result, students with externalizing behaviors may be identified and served under other labels, such as a learning disability (Talbott & Fleming, 2003) or the students may never receive a special education label (Kutash et al.,

2006). Therefore, to improve academic and behavioral outcomes for students with externalizing behavior problems, all students displaying elevated levels of externalizing behaviors, including those with high incidence disabilities other than ED, should be receiving intensive one-on-one interventions that target their specific needs (Kern & Wehby, 2014; Wehby & Kern, 2014).

Students with high incidence disabilities and elevated levels of externalizing behavior problems often experience problems in the classroom that can have academic implications (Sutherland, Lewis-Palmer, Stichter, & Morgan, 2008). With the increased need to improve the behavioral and academic outcomes of students with externalizing behaviors, and with the reauthorization of the Individuals with Disabilities in Education Improvement Act (IDEIA; 2004) along with the passage of the Every Student Succeeds Act (ESSA; 2015), which mandated the use of multi-tiered systems of support, teachers are expected to collect student-specific data and use the data to inform the delivery of their interventions. In multi-tiered systems of supports, such as positive behavioral interventions and supports (PBIS), students who do not respond to universal (Tier 1) supports, typically receive targeted (Tier 2 or Tier 3) interventions that are informed by student-specific behavioral data (McDaniel, Bruhn, & Mitchell, 2015). Targeted (Tier 2 and 3) interventions are common for students with externalizing behaviors because they are likely to need both behavioral and academic interventions to address their complex needs (Lane et al., 2008). It is therefore critical for high school teachers to collect and analyze data for their students who display elevated levels of externalizing behaviors and require individualized interventions. To do so, teachers should utilize a framework that addresses the complex needs of students with externalizing behaviors.

Cognitive-Behavioral Framework

Many of the interventions used to address the complex needs of students with emotional and behavioral disorders have developed from cognitive-behavioral therapy (CBT), which evolved from cognitive theory (Beck, 1970). Cognitive behavioral therapy was developed by Beck (1963) in the 1960s with other colleagues (e.g., Ellis, 1962) as a way to adjust the thinking of people with depression but has since grown to be one of the most widely implemented behavioral interventions. Since its inception, researchers have embedded CBT principles into numerous interventions (e.g., self-monitoring, check-in/check-out) and CBT is now utilized as a framework for addressing both emotional and behavioral problems (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). For instance, interventions such as self-monitoring grew from CBT after researchers noticed that having participants collect their own data improved outcomes beyond the expected effect of the intervention, and researchers hypothesized that the improvements may have been the result of participants becoming cognitively engaged in analyzing why their data had changed (Briesch & Briesch, 2016).

The goal of utilizing a cognitive-behavioral approach is to improve behavior by having people draw attention to their thoughts and then change the pattern of thinking, which in turn allows them to modify their behavior (Hofman et al., 2012). When used to address externalizing behaviors, this approach has been utilized to help students self-monitor their behavior and reflect on how their thoughts affect their behavior (Bruhn, McDaniel, & Kreigh, 2015). After students learn to use self-monitoring to reflect on how their thoughts affect their behavior, they can begin to work on changing their thoughts, and therefore prevent their behaviors from occurring (Hofman et al., 2012). This reflective approach is individualized to each student and can provide a framework to meet the needs of students displaying elevated levels of externalizing behaviors as described by Olson and colleagues (2013). For instance, students who display aggressive or

oppositional behaviors can use self-monitoring to examine what occurred before they manifested an externalizing behavior so that they can prevent it from occurring again.

Data to Inform Individualized Interventions

A process that fits within the cognitive-behavioral theory-based interventions such as self-monitoring and provides a practical guide to teachers implementing individualized interventions is data-based individualization (DBI). The DBI process is an iterative data-based decision-making process that requires educators to collect and analyze student-specific data to deliver and monitor evidence-based interventions (Danielson & Rosenquist, 2014). Progress monitoring student-specific outcomes within a DBI framework provides educators with data to make decisions on how and when to intensify and adapt interventions for each student's specific needs. Adapting interventions based on student-specific progress monitoring allows teachers to individualize interventions and to better address the function of a student's behavior (Kern & Wehby, 2014; Wehby & Kern, 2014). If a student is not responding to an intervention, the intervention can be intensified by increasing dosage, frequency, individualization, or by conducting behavioral and academic interventions together (Fuchs, Fuchs, & Malone, 2017). Due to the complex academic and behavioral needs of students with externalizing behaviors, no single intervention can address every need; however, an evidence-based intervention that has a research base of improving academic engagement and reducing disruptive behaviors is self-monitoring (Busacca et al., 2017; Maggin, Wehby, & Gilmour, 2016).

Self-Monitoring for Students with High Incidence Disabilities and Elevated Levels of Externalizing Behaviors

Self-monitoring is an evidence-based intervention (Maggin, Briesch, & Chafouleas, 2013), and educators using a self-monitoring intervention have demonstrated the ability to

reduce students' externalizing behavior by promoting positive behavioral outcomes (Bussaca et al., 2015). Self-monitoring has its roots in cognitive behavioral therapy (Meichenbaum, 1977) and in self-determination research that developed in the late 1960s when researchers realized that participants collecting their own data improved their outcomes beyond the expectation of the original intervention (Bruhn et al., 2015; Carter, Lane, Crnobori, Bruhn, & Oakes, 2011; Hallahan, Lloyd, Kosiewicz, Kauffman, & Graves, 1979). In self-monitoring interventions, students are expected to collect and monitor their behavioral data, which in turn allows the students to reflect on their behavior and take control of their outcomes. Improving student's self-determination allows them to become more independent, assume a central role in their education, and communicate their strengths, interests, needs, and preferences more effectively (Carter et al., 2011). Self-determination interventions, such as self-monitoring, are likely to be effective for students who display elevated levels of externalizing behaviors described by Olson and colleagues (2013) because those students are more likely than their peers to have limited ability to self-advocate and are more likely to engage in behaviors that diminish their ability to manage themselves (Carter et al., 2011).

Self-monitoring interventions can be delivered with various components. In their review of components included in self-monitoring interventions, Briesch, Daniels, and Beneville (2018) identified that at its core, self-monitoring involves students keeping track of their behavior data (e.g., academic engagement, disruptive behaviors). Self-monitoring may also include components such as students tracking their behavior, teacher check-ins with the student after each session, contingent reinforcement, and student graphing (Briesch et al., 2018). In the past several years researchers developed technology-based applications to ease student and teacher workload by having he application automatically include features such as graphing and goal

setting (e.g., Bruhn, Woods-Groves, Fernando, Choi, & Troughton, 2017; Dooley, 2018) To further personalize self-monitoring interventions, researchers can also collect data to determine the function of a student's behavior (e.g., escape, attention seeking), which allows teachers to tailor the self-monitoring intervention to address the primary function of the behavior, and further improve student outcomes (Bruhn et al., 2015). In recent studies researchers have focused on improving the rate desired behaviors (i.e., respectful, on-task) rather than decreasing negative externalizing behaviors, which is grounded in behavioral theory (e.g., Bruhn et al., 2018). Providing a brief behavioral assessment to increase the rate of desired behavior may reduce the need for teachers to conduct a full functional behavioral assessment, which is time-consuming, costly, and frequently performed for students with a disability (Dunlap & Kern, 2018).

Researchers have conducted over 30 reviews of self-monitoring interventions and have found that they can be effective for Pre-K students through college students, students labeled or at-risk for various disabilities (e.g., learning disabilities, autism spectrum disorder, EBD), can be implemented in various settings (e.g., education classrooms, special education classrooms, juvenile justice facilities), and can improve outcomes related to academic engagement, behavior, and task completion (Briesch et al., 2018; Briesch, & Briesch, 2016; Briesch, & Chafouleas, 2009; Bruhn et al., 2015; Busacca et al., 2015). A majority of self-monitoring research has been conducted with elementary and middle school students displaying various behavioral and academic needs, but several studies have demonstrated effectiveness for high school students with externalizing behavior problems (Briesch et al., 2018; Dooley, 2018). Self-monitoring interventions focusing on students with externalizing behaviors typically include several components delivered in tandem with self-monitoring, with researchers conducting a functional

analysis to determine student needs and initially implement the least intensive format as possible (e.g., self-monitoring alone; Bruhn et al., 2017).

Self-monitoring interventions have become increasingly common in the past two decades, with as many has 90% of school psychologists reporting that they use self-monitoring interventions (Briesch et al., 2018). One reason that self-monitoring interventions are commonly used may be due to the simplicity of the interventions and having students take the responsibility of collecting and monitoring their own behavior data; the intervention may also decrease teacher workload (Briesch et al., 2018). Self-monitoring interventions have recently began to use technology, such as iPad applications, which further decreases the workload of self-monitoring interventions by automatically graphing and providing goal lines, but to date only two studies have utilized electronic self-monitoring with high school students (Bruhn et al., 2016; Dooley, 2018; Wills & Mason 2014). Using electronic self-monitoring applications may be an effective intervention for high school students because they may have experienced numerous teacher-directed behavioral interventions by the time they are in high school, but self-monitoring gives them a chance to take control of their behavioral intervention. Self-monitoring keeps the locus of control primarily with the student, and therefore it is suggested by researchers that self-monitoring is an effective replacement for teacher-directed interventions (Briesch & Briesch, 2016). To examine the efficacy of self-monitoring interventions, researchers need to utilize a research design that allows for individual analysis of the functional relation between self-monitoring interventions and dependent variables.

Single-Case Research of Self-Monitoring Interventions

Researchers conducting systematic reviews of self-monitoring interventions have typically found that studies are conducted using a single-case research design and identify single-

case research as the most appropriate research design for self-monitoring interventions (Briesch et al., 2018; Briesch & Chafouleas, 2010; Bruhn et al., 2015). Single-case research designs are the most appropriate method for self-monitoring interventions because they allow researchers to demonstrate experimental control and examine the presence of the functional relation between the independent and dependent variable by manipulating the independent variable through repeated introductions (Ledford & Gast, 2018). Depending on their research questions, research can use various single-case designs, but a withdrawal (ABAB) design provides the clearest and most convincing research paradigm to evaluate the functional relation when a dependent variable can be reversed by withdrawing the independent variable (Ledford & Gast, 2018). An ABAB single-case research design consists of four phases. In the initial phase (A phase), baseline data are collected in the absence of an intervention, and then in the second phase (B phase), the independent variable (intervention) is introduced. In both phases, data are monitored to make decisions about when to transition to the next phase, and after the completion of the first intervention (B) phase both phases are repeated to complete the four phases. The effects of the independent variable (intervention) are demonstrated if the dependent variable improves in the intervention phases, and approaches baseline levels within the withdrawal condition (Kazdin, 2011). According to the quality indicators established by the Council for Exceptional Children (CEC; Cook et al., 2014), properly designed and executed single-case research designs, wherein researchers implement an ABAB design, control for common threats to internal validity (e.g., selection, maturation, history, temporal precedence). Additionally, What Works Clearinghouse (WWC) standards illustrate that single-case research designs, such as ABAB, are appropriate designs for individualized research because each participant is exposed to every condition in the experiment, and therefore each participant compromises an independent case (Kratochwill et al.,

2010). Lastly, Horner and colleagues (2005) identified single-case research as an appropriate method to identify and validate interventions in real-world settings (i.e., schools) and that doing so with new populations in new settings (i.e., high school students) improves external validity. Therefore, single-case research designs, such as ABAB, are the most appropriate research method to determine whether there is a functional relation between independent variable and dependent variables.

Purpose and Research Questions

It is well documented that students with elevated levels of externalizing behavior are more likely to obtain lower grades, less likely to pass classes, and less likely to have positive peer and adult relationships than their peers with other types of disabilities (Lane et al., 2008; Maggin, Wehby, Farmer, & Brooks, 2016). Improving outcomes for students with elevated levels of externalizing behavior is difficult because both new and veteran teachers report that they feel inadequately trained or prepared to educate students with externalizing behavior problems (Wehby & Kern, 2014). Furthermore, 43% of students with externalizing behavior problems are taught in general education settings for 80% or more of their day (Cook, Rao, & Collins, 2017). Therefore, both general education and special education teachers can benefit from classroom-based interventions that can be delivered in general education settings for students with elevated levels of externalizing behaviors.

Self-monitoring interventions are an often-used behavioral management strategy to improve student outcomes, but a majority of the research has been with elementary and middle school students and has not included electronic self-monitoring or students with elevated levels of externalizing behaviors. For instance, in their review of single-case research of self-monitoring interventions for student behavior, Briesch and Briesch (2016) found that the average

age of the students in the studies was 11 years old, and only 6% of the studies included in the review were conducted in a high school with students who are labeled with a high incidence disability and who display elevated levels of externalizing behaviors, and only two studies have used electronic self-monitoring in a high school setting. To address this gap, more research is needed on electronic self-monitoring with high school students displaying elevated levels of externalizing behavior. Recently, researchers began testing MoBeGo, an electronic self-monitoring application on iPads that includes goal setting and graphing with elementary and middle school students (Bruhn, Hirsch, & Kittleman, 2019). Research indicates that included goal setting and graphing may also be effective for high school students who display elevated levels of externalizing behavior (Dooley, 2018). Therefore, the purpose of this single-case research study was to assess the efficacy of an electronic (MoBeGo) self-monitoring intervention to improve academic and behavioral outcomes for high school students with an individualized education program (IEP) for a high incidence disability who also displayed elevated levels of externalizing behaviors. The following research questions guided this study.

1. Is there a functional relation between an electronic (MoBeGo) self-monitoring intervention and dependent variables of academic engagement and respectful behavior for high school students with high incidence disabilities and elevated levels of externalizing behavior?

2. To what extent can high school teachers and students with IEPs use an electronic (MoBeGo) self-monitoring intervention with fidelity?

3. To what extent do teachers and students with IEPs who implement an electronic (MoBeGo) self-monitoring intervention find the intervention to be effective and acceptable for continued implementation?

Hypotheses

1. There will be a functional relation between an electronic (MoBeGo) self-monitoring intervention and dependent variables of academic engagement and respectful behavior for high school students with high incidence disabilities and elevated levels of externalizing behavior.

2. High school teachers and students will be able to implement an electronic (MoBeGo) self-monitoring intervention with fidelity.

3. High school students and teachers will rate the electronic (MoBeGo) self-monitoring intervention as a socially valid intervention.

II.LITERATURE REVIEW

Students with high incidence disabilities and elevated levels of externalizing behavior may display disruptive actions that negatively affect their ability to engage in school and cause them to experience poor academic and post-secondary outcomes (Cairns et al., 1989; Lane et al., 2008; Maggin et al., 2016; Wagner & Newman, 2012). Thus, they require interventions that can help them stay on-task and increase their positive behaviors (Lane et al., 2008). However, students who display externalizing behaviors may not be identified as having a disability or might be mislabeled (Talbott & Fleming, 2003), and therefore not receive the additional supports they require. Additionally, students may only manifest disruptive externalizing behaviors for brief periods and never receive special education services, but will still require targeted interventions (i.e., Tier 2 or Tier 3; Maggin et al., 2016). Therefore, it is imperative for educators to provide interventions that meet the needs of all students, not only those receiving special education services (Every Student Succeeds Act, 2015).

Despite the growing evidence base for utilizing student-specific data to provide individualized behavioral interventions, teachers of students with elevated levels of externalizing behaviors still struggle to deliver evidence-based behavioral interventions in their classrooms (Barrett et al., 2013). The reasons that teachers do not implement interventions vary widely, but teachers most often cite not having the time, knowledge, or training to provide interventions; therefore, educators are searching for interventions that incorporate student directed components (Briesch et al., 2018). An evidence-based intervention that addresses the needs of students with elevated levels of externalizing behavior, and has the student collect and monitor data, is self-monitoring (Busacca et al., 2015). Using self-monitoring interventions allows students to individually collect their own behavior data, which teachers and students can then use to further

inform the delivery of the self-monitoring intervention by incorporating other components (e.g., contingent reinforcement, goal setting, positive feedback).

Self-monitoring research has a history dating back to the late 1960s (e.g., Bolstad & Johnson, 1972; Lovitt, 1972; Lovitt & Curtiss, 1969), and is derived from cognitive-behavioral theory (Bruhn et al., 2015; Meichenbaum, 1977). In the 1960s researchers began to realize that asking participants in their studies to record their behavior may have had a positive impact beyond the intended intervention (Briesch & Briesch, 2016). Since then, the term self-monitoring has expanded to include many different strategies and components. Therefore, to synthesize the research base and draw conclusions, it is first important to define self-monitoring and its numerous components.

Definition and Components of Self-Monitoring

Definition. Self-monitoring is a behavioral management intervention where students self-record their behavioral data (Briesch et al., 2018; Nelson & Hayes, 1981). Based in cognitive-behavioral theory, self-monitoring is a strategy for students to monitor their own behavior by a) observing, recording, and evaluating an explicitly defined behavior, b) students attempting to gain independence in developing and maintaining positive outcomes, and c) generalization of the skills beyond the initial setting (Chafouleas, Sanetti, Jaffery, & Fallon, 2012). Therefore, self-monitoring is a system where students collect data on their own behavior, and in the process of collecting data, students become cognizant of their actions and how their thoughts affect their behaviors. However, the intervention can consist of additional components to assist in improving student outcomes, such as teacher feedback or contingent reinforcement.

Components. Students using self-monitoring interventions usually record their behavior in fixed intervals (e.g., every five minutes), which has historically been recorded on paper.

Recently though, self-monitoring interventions are increasingly being conducted electronically, which provides immediate data at the end of each session that can be graphed and analyzed. Depending on student need, other components may be added so that the intervention can be tailored to meet each student's needs. Common components that are added to increase intensity include graphing, goal setting, adult feedback, contingent reinforcement, or other components depending on the-individual needs of the student (Briesch et al., 2018). In their review of self-monitoring interventions, Briesch and colleagues (2018) found that the eight most common combination of components were a) self-monitoring alone, b) self-monitoring with graphing, c) self-monitoring with reinforcement, d) self-monitoring with adult feedback, e) self-monitoring checklist with adult feedback, f) self-monitoring with a contingent reinforcement based on performance, g) self-monitoring with a contingent reinforcement based on accuracy of data collection, and h) self-monitoring with a contingent reinforcement based on both performance and accuracy. However, even though reviews have been conducted on self-monitoring components and efficacy, there is still a research gap in self-monitoring with high school students, especially those with elevated levels of externalizing behaviors.

Review of Self-Monitoring Interventions

As noted, although research of self-monitoring has an extensive body of research to support its effectiveness, there is still a need to synthesize self-monitoring research to analyze how the intervention can be tailored to fit the needs of high school students with high incidence disabilities and elevated levels of externalizing disorders. To synthesize the research, I first examined published systematic reviews of self-monitoring, and I also conducted a separate review of the literature with-individual studies where researchers used self-monitoring interventions for high school students with high incidence disablities and elevated levels of

externalizing behaviors. I then conducted an analysis of the systematic reviews and individual studies with high school students who displayed elevated levels of externalizing behaviors to analyze a) participant characteristics, b) research designs, c) dependent variables, d) intervention components, e) the inclusion of technology, and f) efficacy (i.e., functional relation).

Systematic reviews of self-monitoring. The first component of my review is an examination of systematic literature reviews of self-monitoring. A systematic literature review was defined as a review on a specific topic (e.g., self-monitoring) that includes formal and transparent inclusion criteria and used explicit search methods that could be replicated (Talbott, Maggin, Van Acker, & Kumm, 2018). Reviews of self-monitoring interventions date back to the late 1980s (e.g., Fantuzzo, Polite, Cook, & Quinn, 1988). They include at least five systematic reviews (Briesch et al., 2018; Briesch & Briesch, 2016; Briesch, & Chafouleas, 2009; Bruhn et al., 2015; Busacca et al., 2015) conducted in the past decade, with authors of each review analyzing different aspects of self-monitoring research (e.g., research design, intervention components, populations). To be included in my analysis, the reviews had to be systematic, focused on self-monitoring interventions, and be conducted in a school setting. I began with the Briesch and Chafouleas (2009) review, because that review and the subsequent reviews included studies dating back to 1971, when self-monitoring interventions were first researched. Therefore, including additional reviews of self-monitoring that were published before 2009 would not result in the inclusion of any additional studies. I included reviews in which researchers had included studies that were single-case and group design, published and unpublished, as well as studies where researchers examined intervention effectiveness (efficacy) and intervention components. The authors of the systematic reviews of self-monitoring reported effect sizes in three different categories: Cohen's *d*, Pearson's Phi Coefficient, and percentage of overlapping data (PND). To

understand the results that the researchers reported (see Table 1), it is important to know what the results of each effect size indicate. One can interpret Cohen's *d* effect sizes as follows: .2 is a small effect size, .5 is a medium effect size, and .8 is a large effect size (Faraone, 2008). One can interpret Pearson's Phi as follows: .3 is negligible, .3 to .49 is small, .5 to 69 is moderate, and .7 or above is strong (Cohen, 1968; Cohen, 1988). One can interpret PND as follows: 90% or higher is highly effective, 71% to 90% moderately effective, 50% to 70% minimally effective, and anything below 50% is not effective (Gast & Ledford, 2014). Characteristics of each of the five systematic reviews are displayed in Table 1, and then further expanded in the text that follows.

Table 1

Systematic Reviews of Self-Monitoring Interventions since 2008

Article	Purpose	Number of Studies	Intervention Characteristics	Participants	Outcome Measures	Findings
Briesch et al. (2018)	Efficacy intervention components	56	Eight common combinations of components	n=182	82% On-task, 11% DB	Phi mean effect size: .83
Briesch & Briesch (2016)	Efficacy	47	34% self-monitoring alone	n=159; 11 years old, 79% male, 14% ADHD, 13% EBD	81% On-task, 9% DB	Phi mean effect size: .93
Briesch & Chafouleas (2009)	Efficacy and intervention components	30	16 different combinations of components, average of 7.6 per study.	n=106; 11.5 years old, 84% male, 50% EBD	93% AE, 23% DB	Cohen's d – 4.11, PND – 76%
Bruhn et al., (2015)	Intervention components	40*	Reinforcement, Feedback, Function-	n=231; 84% male,	42 DVs, AE (53%)	Most common: Reinforcement, Adult

			Based, Technology	K-12 schools	most common	feedback, Function-Based, Technology
Busacca et al., (2015)	Efficacy	16	Not Reported	$n=70$; 10.3 years old, 80% male, 36% ADHD, 7%EBD	74% AE, 26% DB	PND – 90%
Maggin et al., 2013	Application of What Works Clearinghouse Standards	30	16 different combinations of components, average of 7.6 per study.	$n=106$; 11.5 years old, 84% male, 50% EBD	93% AE, 23% DB	Cohen's d – 4.11, PND – 76%

Note. N = number of participants; ADHD = attention-deficit/hyperactivity disorder; EBD = emotional and behavioral disorder; AE = academic Engagement; DB = disruptive behavior; DV = dependent variable; PND = percentage of non-overlapping data, * indicates the review included group research design, a total of $k =1$ group design was included across all of the reviews.

To update one of the first systematic reviews of self-monitoring (Fantuzzo & Polite, 1990), Briesch and Chafouleas (2009) conducted a systematic review and meta-analysis of self-management interventions that promoted appropriate classroom behaviors and were published between 1988 and 2008, which included a total of $k = 30$ studies (Briesch & Chafouleas, 2009). A total of $k = 20$ of the studies included students with elevated levels of externalizing behaviors, and the interventions were just as likely to be implemented in a general education classroom as a self-contained classroom. Briesch and Chafouleas (2009) also examined intervention components and identified $n = 16$ different combination of components of self-monitoring interventions that were used, though the studies varied greatly in which components they included. On average, each self-monitoring intervention contained $M = 7.6$ components, which was slightly less than $M = 9.6$ that Fantuzzo and Polite (1990) reported. The studies included in

the Briesch and Chafouleas (2009) review all included self-observation and recording of explicitly defined behaviors, which the authors reported were the core aspect of self-monitoring interventions. The authors also calculated Cohen's *d* and PND to analyze the overall effectiveness of the interventions. A Cohen's *d* mean effect size of 4.11 was reported, which indicates a very strong effect (Faraone, 2008). Additionally, a PND of 76.5% was reported, which is in the moderate effectiveness range (Scruggs & Mastropieri, 1998), indicating that the intervention was effective. Briesch and Chafouleas (2009) also conducted a component analysis to determine if the number of components included in a self-monitoring intervention affected outcomes and determined that there was not a strong relationship between the number of components included and effectiveness. Additionally, no statistically significant differences in effect sizes were found for disability status or intervention setting. The Briesch and Chafouleas (2009) review was also analyzed using the WWC standards for single-case research (Kratochwill et al., 2010), which are a set of standards developed to determine if an intervention can be considered evidence-based, by Maggin and colleagues (2013), and they found that self-monitoring was an evidence-based practice. However, even though Maggin and colleagues (2013) identified self-monitoring as an evidence-based intervention, additional reviews of self-monitoring were conducted to continue assessing which components (e.g., adult feedback, graphing, contingent reinforcement) are most effective (e.g., Bruhn et al., 2015).

To further analyze the role of self-monitoring components (e.g., technology, reinforcement) for students with behavior problems, Bruhn and colleagues (2015) reviewed k = 41 studies published between 2000 and 2012. This review included single-case (*k* = 39) and experimental group studies (*k* = 1) conducted in K-12 public schools. In total, only three of the studies in their review were conducted in a high school, and the interventions were most likely to

be implemented in a general education classroom ($n = 17$), followed by self-contained ($n = 7$), and lastly in an inclusive setting ($n = 5$). A total of $n = 42$ different dependent variables were monitored across the studies, with on-task behavior ($n = 22$) being the most common. The focus of this review was on intervention components and their effect on outcomes. In their examination of intervention components, Bruhn and colleagues (2015) found that a majority ($n = 32$) of the interventions included reinforcement and adult feedback ($n = 25$), but few ($n = 8$) included function-based assessments, and very few ($n = 2$) used technology to record student behaviors. The authors did not conduct a meta-analysis across all of the studies, but all of the researchers did report improvement, and the review may provide evidence that including additional components can improve outcomes for some students (Bruhn et al., 2015). Not enough studies were included to provide a definitive statement on which components were most effective or which to use with specific student populations, and Bruhn and colleagues (2015) did note a need for future research on the relationships between the function of the behavior and intervention components. They also noted that feedback may be essential for students who display behavior to access attention. However, Bruhn and colleagues (2015) noted that their review included all of the studies that they found, and that future research could focus on studies that met established quality indicators for high-quality research.

To review self-monitoring interventions that met the WWC standards for high-quality research, Busacca and colleagues (2015) conducted a meta-analysis of $k = 16$ single-case design studies conducted between 1972 and 2014 that focused on problem behaviors of $n = 61$ students in general education settings in primary schools. Of the $k = 16$ studies that met the WWC standards, researchers reported that $k = 11$ obtained a PND estimate of very effective, $k = 4$ were effective, and $k = 1$ was inconclusive. Busacca and colleagues (2015) determined that the results

supported Maggin and colleagues (2013) findings that self-monitoring was an evidence-based practice. They also found that self-monitoring interventions were effective across behaviors, disability categories, and grades. Busacca and colleagues (2015) did not examine intervention components to analyze which were most effective, but they did note that one study used a function-based self-management intervention and it had a PND of 99.08%, which indicated that including a function-based assessment of a student's behavior might improve outcomes. The researchers also highlighted a need for additional high-quality studies to examine moderating factors related to whom self-monitoring interventions are most effective and which components impact effectiveness for different populations.

To analyze the moderating factors in self-monitoring research, such as participant age, disability status, and components included, Briesch and Briesch (2016) conducted a meta-analytic review of $k = 47$ single-case of behavioral self-monitoring interventions published between 1971and 2011. The self–monitoring interventions included in this review were more likely to be implemented in a special education setting ($n = 27$) than in a general education classroom ($n = 20$), and roughly one-third ($n = 15$) of the interventions utilized self-monitoring in the absence of other components. In the meta-analytic portion of their review, Briesch and Briesch (2016) found that there was a strong effect size (Cohen's $d = .93$) and there was not a statistically significant difference in outcomes across ages or educational settings. However, Briesch and Briesch (2016) reported that interventions with numerous components (e.g., reflection, accuracy, rewards) were less effective than interventions with fewer components and that students with an ADHD diagnosis obtained slightly lower effect sizes. These findings might indicate that using numerous components may not be beneficial and therefore components should be minimal and only include components that are tailored to the needs of specific

students. Additionally, Briesch and Briesch (2016) reported that stronger effect sizes were identified for studies that a) assessed student rating accuracy, b) asked students to reflect on their behavior, and c) did not incorporate evaluation or rewards. As previously noted, there was not a statistically significant difference between student ages, which indicates that the intervention components were apparently effective across all ages.

To update their analysis of self-monitoring interventions, and to determine which components of self-monitoring interventions were being incorporated and their effect on outcomes, Briesch and colleagues (2018) conducted a meta-analytic review of $k = 56$ single-case studies where interventions were delivered in K-12 schools from 1971-2015 that met the WWC methodological standards. The major focus of Briesch and colleagues (2018) study was an analysis of the components that were incorporated into the intervention, of which they found eight primary versions. The most common combination of components ($n = 23$; 41%) included self-monitoring in the absence of additional components (e.g., feedback, contingency-based reinforcement) and self-monitoring with adult feedback on outcomes ($n = 23$; 41%), followed by self-monitoring with graphing ($n = 5$; 9%), self-monitoring with a checklist across periods ($n = 3$; 5%), self-monitoring with self-evaluation and a contingent reinforcement ($n = 2$; 4%). A meta-analysis was conducted on each unique combination of components to determine effect sizes for each combination, and each one was found to have a positive statistically significant improvement. However, it is important to note that there was a high degree of effect size heterogeneity, which meant that there was a lot of variance in effect sizes making it difficult to determine which combination of components was most effective. Thus, the results of the meta-analysis did not indicate which combination of components was most effective for a specific population.

Although there have been numerous reviews of self-monitoring interventions, and it is considered an evidence-based practice, there still remain gaps in the literature. Although several researchers have examined intervention components (e.g., Briesch & Chafouleas, 2009; Bruhn et al., 2015), there is still no guidance on which components are likely to be most effective for youth with specific characteristics. For instance, teachers of students with elevated levels of externalizing behaviors do not have any guidance on which specific components are typically required to be most successful for their students. Another gap in the literature is research with high school students. The reviews of literature on self-monitoring identified very few ($k = 6$) studies with high school students who displayed elevated levels of externalizing behaviors.

Self-Monitoring Interventions for High School Students with High Incidence Disabilities and Elevated Levels of Externalizing Behaviors

To examine self-monitoring interventions with high school students with high incidence disabilities who display elevated levels of externalizing behaviors, I conducted a systematic review of individual studies of self-monitoring interventions. To be included in this review, studies had to meet the following inclusion criteria: a) the independent variable included self-monitoring, b) the study was conducted with high school aged youth, c) the studies included students who had a high incidence disability status that put them at-risk for elevated levels of externalizing behaviors (e.g., ADHD, ED), d) the dependent variable included on-task behavior or behavior (i.e., improving a defined student behavior). Studies were excluded if all of the participants had low incidence disabilities or the outcome measure was academic (e.g., number of questions answered correctly). I identified studies by searching previous reviews of self-monitoring interventions, such as the studies in Table 1, and conducting electronic searchers using the following data bases: ERIC and PyscINFO. The search included all studies from the

earliest years to 2018 and included both published studies and dissertations (Pigott, Valentine, Polanin, Williams, & Canada, 2013). However, several dissertations ($k = 2$) published more than 20 years ago could not be retrieved via interlibrary loan, and therefore could not be screened for this review. A total of $k = 8$ studies ($k = 5$ peer-reviewed articles; $k = 3$ dissertations) met the inclusion criteria and are included in this review. All of the studies that met the inclusion criteria were single-case studies. All of the included studies were analyzed to synthesize both the effectiveness of the intervention and its intervention components. Additionally, I analyzed the single-case graphs from each study to determine if there was a functional relation between the independent and dependent variable. A functional relation is defined as establishing a consistent effect on a dependent variable by systematically manipulating the independent variable (Kennedy, 2005). For this review, I determined that there was a functional relation between the dependent and independent variable if (a) the researcher demonstrated experimental control by systematically manipulating the independent variable and controlling for internal threats to validity through at least three condition changes within these designs, and b) a visual analysis of a single-case graph indicated a clear and sustained change between intervention and baseline phases (Scruggs & Mastropieri, 1998). Additionally, the findings from this review were then used to identify the components that I will use in my research study. Descriptive information is provided in Table 2.

Table 2

Single-case Studies Using Self-Monitoring Interventions for High School Students with High Incidence Disabilities

Study	Number of Participants	Disability Status	Intervention Components	Dependent Variable	Study Design	Functional Relation

Caldwell (2011)	$n = 3$	ED, ADHD, CD	Self-monitoring, graphing	Time on Task, Academic Productivity, and Accuracy	ABAB	Yes
Davis (2014)	$n = 1$	At-risk, teacher and self-nomination	Self-monitoring, reinforcement	On-task	Alternating Treatment Design, MBL across settings	Yes
Dooley (2018)	$n = 2$	EBD	Self-monitoring, reinforcement	On-task	ABAB	Yes
Graham-Day (2010)	$n = 3$	ADHD	Self-monitoring, reinforcement	On-task	Alternating Treatment Design	Yes
Howard (2015)	$n = 2$	EBD	Self-monitoring, goal setting, self-evaluation, self-reinforcement	Academic Engagement, Problem Behavior	ABAB	Yes
Prater (1992)	$n = 1$	LD, BD	Self-monitoring	On-task	ABAB, MBL across settings	Graph Not Provided
Stewart (1992)	$n = 1$	ADHD	Self-monitoring, Adult feedback	Off-task	ABAB	Yes
Wills & Mason (2014)	$n = 2$	SLD, ADHD	Self-monitoring	On-task, Disruptive Behavior	ABAB	Mixed

Note. ED = Emotional Disturbance; ADHD = Attention-deficit/hyperactivity disorder CD = Conduct Disorder; EBD = Emotional and Behavioral Disorder; SLD = Specific Learning Disability; BD = behavioral disorder; MBL = multiple baseline.

In an early study on self-monitoring, Prater, Hogan, and Miller (1992) examined the effect of self-monitoring with a 9th grade student who was receiving special education services for both a learning disability and a behavioral disorder. The study was conducted in a resource room, in a general education math room, and in a general education English room. The student self-recorded his on-task behavior for 30 minutes in each setting, but the intervention did not consist of any additional components besides self-monitoring. The student was not prompted to record their behavior, which meant the self-monitoring only occurred whenever the student thought about tracking their behavior. However, the researcher did collect data at regular intervals, and the data included in the results showed improvement, but single-case graphs could not be retrieved with this study, and therefore a functional relation could not be determined. To further assess self-monitoring for high school students with high incidence disabilities and elevated levels of externalizing behaviors, Stewart and McLaughlin (1992) used the intervention with a 9th-grade student with ADHD who was in a self-contained classroom and was failing all of his courses. During the intervention phases of this study the teacher would use praise the student each time he sustained five consecutive minutes without displaying an off-task behavior, and the results were sent home to the student's parents at the end of each week. Teachers who were not part of this study reported that there was a lack of generalization, and the student's behavior did not improve during their classes, but the student did improve his on-task behaviors and reduced the severity of their off-task behavior while using this intervention during the observations of this study. Although both of these single-case studies showed promise for increasing on-task behavior, no additional studies were identified in this current review that further examined the intervention for high school students with elevated levels of externalizing behaviors for more than 15 years.

Graham-Day, Gardner, and Hsin (2010) noted the lack of recent research on self-monitoring interventions with high school aged youth with high incidence disabilities elevated levels of externalizing behaviors and conducted a study of the effectiveness of a self-monitoring intervention to increase on-task behavior for high school students with ADHD. In this study, the researchers used an alternating treatment design that included baseline, self-monitoring, and self-monitoring with reinforcement to determine whether the intervention was more effective when it included one or two components. The researchers collected data with three students, but a total of 13 were in the class and used the self-monitoring intervention during the study. In the self-monitoring only phase, the students used a checklist to determine if they were on or off-task for a 20-minute period. During the reinforcement phase, students received their reinforcement for accuracy of data recording, rather than for meeting a specific behavioral goal. In the self-monitoring with contingent reinforcement phase, participants were chosen at random, and if they accurately recorded their data the entire class, they received a piece of candy. Overall, the self-monitoring interventions displayed a functional relation for all three of the student participants, with two demonstrating improvement by reaching their goals with only the self-monitoring component, but one student only showed improvements during the intervention with a reinforcement phase.

To examine the effectiveness of self-monitoring in alternative education settings Caldwell's (2011) dissertation examined self-monitoring interventions with high school students high incidence disabilities during independent math work in a juvenile justice facility. Participants in this study were female students who either displayed low levels of academic engagement or high levels of distractibility. The self-monitoring intervention was conducted by using paper to record behaviors. Student participants also set goals, graphed, and analyzed their

data each day. Researchers analyzed three outcome measures, as identified in Table 2, but academic engagement was the primary outcome that was analyzed to make decisions related to transitioning phases. The researchers also included a fading phase at the end of each study to analyze if the student's behaviors improved when the intervention was faded. Overall, the student's engagement and completion improved and indicated a functional relation between the self-monitoring interventions and those independent variables, but the accuracy of their answers did not indicate a functional relation with the intervention. As with the previous studies of high school students, Caldwell (2011) used a traditional paper system for self-monitoring, but recently software has been developed to collect and analyze student self-monitoring data.

Davis and colleagues (2014) examined the effectiveness of self-monitoring alone and self-monitoring with a reinforcement by conducting an alternating treatment design that was also conducted across three different classroom settings where the student displayed off-task behaviors. During the self-monitoring only phase, the student participant wore a watch that vibrated every minute to indicate when to record behavior, and the student then tracked his behavior on a sheet of paper. The reinforcement phase was the same, but a token economy system was added. The student could earn two tokens per session by meeting pre-determined performance criteria. One token was awarded if the student displayed a minimum of 80% on-task behavior over a 20-minute interval, and a second token if the student had 80% or greater inter-observer agreement with a second observer. The reinforcement was a gift card to a gift card to a coffee shop per every five tokens earned. The student did show improvement with self-monitoring alone, but not enough to indicate a functional relation. However, the self-monitoring with a contingent reinforcement phase did demonstrate improvement and a functional relation.

Howard (2015) used a component analysis to evaluate the effectiveness of each component for a function-based self-management intervention with two high school students who were nominated by their teachers for displaying low academic engagement or disruptive behavior. Prior to the intervention, the researcher conducted a functional behavior analysis to select target behaviors and settings where the intervention would be delivered. The researcher then conducted the baseline phase. The first intervention phase consisted of the researcher introducing self-monitoring components one at a time until all of them were introduced. The components were introduced in the following order, a) goal setting, b) goal setting and self-monitoring, c) goal setting, self-monitoring, and self-evaluation, d) goal setting, self-monitoring, self-evaluation, and self-reinforcement. The students then returned to the baseline phase. The intervention data were analyzed using component analysis to determine the effectiveness of each component and then thee second intervention phase consisted of the components that were determined to be the most successful for each student. The teachers were then consulted to determine which intervention components they could deliver with fidelity, and it was then determined that one student would experience three components but not self-reinforcement, and the other student experience all four components. The interventions were successful for all students, with each indicating a functional relation for both engagement and problem behaviors.

As technology becomes more readily available in classrooms, researchers are investigating the use of technology-based self-monitoring interventions to improve student academic and behavioral outcomes (Bruhn, Waller, & Hasselbring, 2016). To study the effect of a technology-based self-monitoring intervention, Wills and Mason (2014) conducted a study in general education classrooms using I-Connect, a tablet-based application with two high school students, both of whom were nominated by their teacher for exhibiting off-task behavior. In this

study, students collected data at 5-minute intervals for a total of 20-minutes. The primary dependent variable was on-task behavior, and disruptive behavior was used as a generalization measure, which were both collected in the general education classroom. Both of the students improved their on-task behavior, but the data related to their disruptive behaviors was variable, and therefore a functional relation could not be determined. Additionally, each of the students and the teacher rated the intervention positively in the social validity assessment.

Dooley (2018) also used technology by incorporating the SCORE IT (Bruhn et al., 2015) self-monitoring iPad application to examine the effect of electronic self-monitoring in a high school setting. The students in this study were in 9th and 12th grade, and both were nominated by teachers for displaying low levels of on-task behavior. The SCORE IT application automatically allowed researchers to incorporate a goal line and graphs of the data for the students after each session. Student goals were increased by 5% each week and when the students met or exceeded their goal for the day, they were provided with a contingent reinforcement (e.g., gum, guitar pick, writing utensils). The researcher in this study monitored on-task behavior for 20-minutes during a general education English course. Only one of the students attended school often enough during the study to determine a functional relation, but both did show improvement during the intervention phases.

Collectively, this review of self-monitoring interventions for high school students with or at-risk of elevated levels of externalizing behaviors included seven studies in which researchers demonstrated a functional relation between the independent and dependent variable and one study that reported a positive outcome, although the graph could not be obtained. The students included in this study were either teacher nominated or identified as having a disability that affected their behavior or ability to remain on-task. The components included in interventions

varied and only two of the more recent studies incorporated technology. This may suggest that self-monitoring interventions can be effective for a diverse range of high school students displaying elevated levels of externalizing behaviors and that the interventions only need to include a few components to improve outcomes. The most common components used in the studies were self-monitoring, adult feedback, and contingent reinforcement, with recent studies increasingly using technology.

There were also several limitations and gaps across the studies conducted with high school students. An application of Council for Exceptional Children (CEC) quality indicators found common methodological limitations across the studies (Cook et al., 2014). The methodological features with the lowest scores included not reporting proper training to implement the intervention, not clearly explaining the materials required to implement the intervention, and across the studies the researchers rarely monitored implementation fidelity. Another gap is the lack of technology incorporated in self-monitoring interventions. Although technology is becoming increasingly common in in schools and can decrease teacher and student workload, there have only been two The findings from the review of self-monitoring for high school students that were generally aligned with the results reported by researchers who conducted systematic reviews and a summary of the findings are expanded upon below.

Common Themes

In this analysis of systematic reviews of self-monitoring and individual studies of self-monitoring interventions that have been conducted with high school students displaying elevated levels of externalizing behaviors, I identified several common themes related to participant characteristics, research design, dependent variables, intervention components, technology, and efficacy.

Participant characteristics. Self-monitoring interventions are commonly used by both educators and researchers, which has resulted in studies with a diverse range of populations, ranging from prekindergarten to adult. However, a vast majority of research on self-monitoring interventions has been conducted with students in K-8 school settings (Briesch & Briesch, 2016). I hypothesize that the focus on K-8 settings may not be due to the intervention being most effective for K-8 aged youth, but instead may be due to more research typically being conducted in K-8 schools than high schools. In regard to the characteristics of the student's behaviors, there is a diverse population of students (i.e., with regard to disability characteristics) included in self-monitoring intervention research. Due to on-task behavior and disruptive behavior being the most common outcome measures, student participants were most commonly identified with (ADHD), conduct disorder, emotional and behavioral disorder, or otherwise display externalizing behavior problems. When the researchers conducting meta-analysis included a moderator analysis, only Briesch and Briesch (2016) found that the intervention was less effective for students with ADHD, but the other researchers found that there was no difference across disability status.

Research design. The most common theme across both the reviews of self-monitoring and the studies with high school students was the use of a single-case research design, which is most likely due to the individualized nature of self-monitoring interventions. The most common single-case research design was an ABAB withdrawal design in which the intervention was completely withdrawn and then reinstated (e.g., Caldwell, 2011; Dooley, 2018; Howard, 2015). Other common methods included multiple-baseline designs across settings, which typically involved different classroom settings (e.g., math, English, science). Researchers also utilized alternating treatment designs to assess the use of self-monitoring alone, or self-monitoring with

other components, most commonly with a contingent reinforcement. Another common method used by researchers was a changing criterion design where student's goals were increased between phases. The research designs that were utilized by the researchers allowed them to analyze if self-monitoring was effective, and under what conditions (e.g., general education, self-contained), and which components were effective for specific students.

Dependent variables. The most common outcome measures across the studies of self-monitoring interventions were related to on-task behavior or academic engagement, which typically had similar definitions. Researchers considered students to be on-task or academically engaged if they observed a student working on assigned content, engaged in a class discussion, completing group work, or engaged in other student expected behavior during classroom instruction. The second most common dependent variable was disruptive behavior or a construct with similar characteristics but a different name (e.g., inappropriate behavior). Researchers categorized disruptive behaviors as events that disturbed the learning of others, such as talking, tapping or hitting objects, walking around the classroom, or engaging in other activities that may distract students. Lastly, with the onset of technology, some newer self-monitoring interventions have students track multiple behaviors and then provide overall feedback on student behavior. This can provide students and teachers with a chance to analyze several behaviors and determine if the intervention is having an impact on more than one behavior.

Intervention components. A strength of self-monitoring interventions is that components can be tailored to meet the needs of each student and can fit within the resources available in schools. In my review, I noted that several researchers have analyzed the number of components involved, and the efficacy of those various components. The most commonly used component was student directed self-monitoring without any additional components. Other

common components involved students meeting with their teachers to reflect, students graphing their behaviors and using the graph to reflect, and contingent reinforcement. The reinforcement was either provided if the student reached a preselected goal, or if the student data were accurately collected, typically by comparing it with teacher collected data. To assess the efficacy of components, researchers often first implemented the intervention alone and then intensified the intervention if the student was not responding, most often by providing a contingent reinforcement. Studies using different combinations of components reported varying effect sizes, but self-monitoring alone, self-monitoring with teacher feedback, and self-monitoring with contingent reinforcement were reported as being the most effective in both the reviews of self-monitoring and in the induvial research studies with high school students. The most common components across the studies I reviewed were self-monitoring, adult feedback, and contingent reinforcement, with recent studies increasingly using technology.

Use of technology. Self-monitoring interventions have been utilized for over 40 years, and the fundamental characteristics of the intervention have not changed since its earliest iterations. However, technology is playing an increasingly larger role in self-monitoring interventions. Traditional self-monitoring interventions typically involved students being prompted by an audio tone and then using paper and pencil to record their data, which they could then manually graph if they chose. Recently educators and researchers have used behavior management interventions in iPads, such as SCORE IT (Bruhn et al., 2014; Dooley, 2018; Vogelgesang et al., 2016) and MoBeGo (Bruhn, Rila, Mahatmya, & Estrapala, 2018) which uses silent visual prompts, automatically incorporates goal setting, and graphs outcomes immediately after each session. The data from those applications can then be shared electronically with other educators or a student's parents or guardians. It is not yet known if using technology to record

and analyze data will improve outcomes beyond the traditional paper and pencil method but using technology does allow for the automatic incorporation of goal-setting and graphing, which may improve student outcomes. Additionally, self-monitoring was consistently rated as a socially valid intervention that was easy to use in the classroom.

　　　　Efficacy. Self-monitoring interventions, in various formats and with diverse populations, have proven to be effective at improving student outcomes, and have a robust enough collection of high-quality studies to be considered an evidence-based intervention when assessed using the WWC standards (Busacca et al., 2015; Maggin et al., 2013). Self-monitoring interventions are most commonly used to target on-task behavior, academic engagement, and disruptive behaviors, and researchers measuring those dependent variables have provided evidence of efficacy for diverse student populations (Busacca et al., 2015). The intervention has also been used to track over 100 other dependent variables, and researchers implementing self-monitoring have demonstrated effectiveness for improving wide-ranging outcomes (Briesch & Briesch, 2016). Researchers conducting reviews of single-case self-monitoring interventions have not only found that there is a functional relation between the intervention and the behavior, but they have also synthesized the results and found effect size scores that are high enough to show large improvements (Briesch et al., 2018, Briesch & Briesch, 2016).

Conclusion

　　　　Self-monitoring is an evidence-based intervention (Busacca et al., 2015; Maggin et al., 2013) which can be tailored using various components to meet the individual needs of students. At its core, self-monitoring interventions involve students collecting data and reflecting on their behavior. The evidence base for self-monitoring interventions includes students at-risk for a disability, and students labeled with disabilities, including students diagnosed with autism

spectrum disorders, LD, ED, and ADHD; however, there is a paucity of research on self-monitoring for high school students (Briesch et al., 2018; Briesch, & Briesch, 2016; Briesch, & Chafouleas, 2009; Bruhn et al., 2015; Busacca et al., 2015). Components of self-monitoring interventions may include feedback from adults, contingent reinforcement which can be performance or accuracy based, graphing, and other components as needed to meet the needs of each student.

In this literature of the systematic reviews of literature and self-monitoring interventions for high school students, it appears that self-monitoring interventions for high school aged students with elevated levels of externalizing behaviors should initially incorporate self-monitoring and teacher feedback. Additionally, an electronic self-monitoring application should be used to allow for ease of data collection and analysis, which also automatically incorporates goal setting and graphing. Using electronic self-monitoring applications allows for the application to automatically incorporate evidence-based components (e.g., graphing, goal setting) without increasing student or teacher workload. Furthermore, the teacher feedback and goal setting should be based on a brief analysis of the function of the student's behavior.

III. METHODS

Participant Characteristics

  In this study, I recruited two high school teachers and four high school students with IEPs for a high incidence disability (e.g., LD, EBD, ADHD) who also displayed elevated levels of externalizing behavior. The recruitment and research occurred during the schools third and fourth quarters (March and April). Recruitment did not begin until internal review board (IRB) approval (see Appendix A).

  Sampling procedures. To recruit participants for this study, I first contacted teachers from a public high school district by asking if they taught a student with an IEP for a high incidence disability (e.g., LD, EBD; ADHD) who display elevated levels of externalizing behavior and were interested in participating in a self-monitoring research study. A total of two teachers responded and agreed to participate in this study. The teachers were then asked to nominate students who had an IEP for a high incidence disability and displayed elevated levels of externalizing behavior in their class. To be included in this study, the students had to meet the following inclusion criteria: 1) have an IEP for a high incidence disability, 2) display elevated levels of externalizing behavior, and 3) spend at least 50% of their day in a general education classroom. All of the names used in this manuscript have been changed and are pseudonyms.

  Teacher participants. Two general education high school teachers participated in this study. Both teachers singed a consent form before beginning this study (see Appendix B). Additionally, the parents had to provide consent (see Appendix C) and the students had to provide assent (see Appendix D). One teacher, Mrs. Lynn, recruited a total of three students in her first-period English classes who met the inclusion criteria. The other teacher, Mrs. Wilkinson, recruited one student from her third-period math class. I interviewed the teachers

before the baseline condition to collect the following demographic information: (a) years of experience teaching, (b) special education background, (c) experience teaching students with elevated levels of externalizing behavior, (d) information about the student participants, and (e) information about existing classroom management procedures (see Appendix E). Lastly, the teachers were compensated $250 per each student who participated in this study.

    Mrs. Lynn. Mrs. Lynn was a White female with a master's degree in secondary education and 12 years' experience teaching high school English. Her classes have always included students with elevated levels of externalizing behavior, and she reported that she previously tried several behavioral management strategies. Mrs. Lynn reported that during the academic year that the study occurred she posted positively stated class-wide expectations and attempted to communicate with parents frequently, but she did not report using any specific behavior management strategies or interventions. She identified three students in her first-period class who had IEPs and were displaying elevated levels of externalizing behavior that she was struggling to manage. The three students (Korey, Deandre, Ezekiel) fit the inclusion criteria, and all agreed to participate.

    Mrs. Wilkinson. Mrs. Wilkinson was a White female with a master's degree in secondary education who has taught middle and high school math for nine years. She reported having students with elevated levels of externalizing behavior in her classes for all nine of those years, and she reported using numerous behavior and academic interventions in the past. Mrs. Wilkinson identified a student (Noel) in her third-period math course who was having trouble staying engaged in work and frequently spoke with his peers during academic activities. She reported that she tried one-on-one tutoring with Noel and maintained frequent contact with his parents, but his outcomes were not improving. Mrs. Wilkinson also reported that she used a daily

behavior report card with the Noel, but he very infrequently (i.e., less than once a week) gave her the report card to fill out. She reported that she was not using any other evidence-based behavioral interventions with Noel.

Student participants. The teachers nominated high school students who displayed elevated levels of externalizing behavior in their class and had an IEP for a high incidence disability. For the purpose of this study, I defined a high incidence disability as specific learning disability, ED, or ADHD (Gage et al., 2012; Trainor, Morningstar, & Murray, 2016). To be included in this study, students were required to have an IEP for a specific learning disability, ED, behavioral disorder, conduct disorder, other health impairment, oppositional defiant disorder, or ADHD served under an IEP for other health impairment or a 504 plan. In accordance with previous research with this population (e.g., Bruhn et al. 2015), Mrs. Lynn and Mrs. Wilkinson completed the *Strength and Difficulties Questionnaire* (SDQ; Goodman, 1997) as a screening tool that I scored confirm the presence of externalizing behavior. The results of the SDQ for the students had to be high or very high to be eligible for this study. The SDQ consists of 25 questions and is a psychometrically sound measure for externalizing behavioral characteristics that has been validated with diverse populations around the world (Achenbach et al., 2008; Goodman, Lamping, & Ploubidis, 2010). The SDQ is a commonly used evidence-based assessment for externalizing behaviors that can be briefly administered by teachers, and an SDQ score of high, or very high indicates that a student may have or is likely to have significant emotional, behavioral, and social problems (Bruhn et al., 2015; Goodman, 1997). I provided the teachers with the SDQ form to complete for the student(s) they believe displayed elevated levels of externalizing behavior. The teacher then gave me the SDQ form to score and confirm the existence of elevated levels of externalizing behavior. I also conducted two confirmatory direct

observations to confirm that each student displayed elevated levels of externalizing behavior in the classroom. I conducted the confirmatory direct observations in the same classroom as the study occurred, and I observed them on two consecutive days for the entire class period. Participants were excluded if they (a) did not have an IEP for a high incidence disability, (b) did not receive a high or very high score on the SDQ, (c) did not spend at least 50% of their time in a general education setting, or (d) did not display elevated levels of externalizing behavior during the confirmatory direct observation, but all potential participants met the inclusion criteria

Before the study began, the teachers also conducted a brief assessment to determine the function of the student's behavior by completing a *Functional Assessment Screening Tool* (FAST; Iwata, DeLeon, & Roscoe, 2013). The FAST has three outcome functions that I used in this study: a) attention, b) escape, and c) access to activities. The two teachers were able to recruit a total of four students who met the inclusion criteria and agreed to participate in this study. The teachers nominated a fifth student, but the student's parents refused to provide consent for participation. I then interviewed the four students who participated in this study to collect demographic information related to the student's disability, educational history, and behavioral history (see Appendix F). Lastly, each Friday I compensated students $10 per each day that they participated in the study.

Korey. Korey was a 17-year-old White male who chronologically should have been a junior but had freshman level credits. On more than one occasion Korey stated that school felt hopeless because he would never obtain enough credits to graduate, and he was not passing any of his classes when this study occurred. He received an IEP and diagnosis of ADHD roughly six months before this study began, but he stated that he was always a class clown and always talked to his peers during academic instruction. Korey attended a school district in a different state until

this academic year, but he had poor attendance at his previous school and never received an IEP.

Mrs. Lynn recommended Korey for a special education evaluation earlier in the school year,

which resulted in his ADHD diagnosis. Despite the increased services provided by his IEP,

Korey accrued more than 103 absences in the school year. Korey also became a father several

days before the study began, which he stated caused him to lose sleep and further struggle in

class, and he identified staying focused and quiet as his biggest challenges in class. Korey said

that his previous teachers used contingent reinforcements, specifically food, and that was the

most effective intervention for him, but he did not know his IEP behavior goals. Korey scored in

the very high range on the SDQ, and the FAST results indicated that the primary function of

Korey's behavior was attention-seeking, but he also scored high on escape. The FAST results

indicated that Korey was most likely to display behaviors to seek attention from his peers, but he

also displayed behaviors to avoid classwork. During the two confirmatory direct observations

that I conducted in Mrs. Lynn's class before the study began, Korey was academically engaged

24% and 21% of the class period, and he displayed respectful behavior 32% and 36% of the class

period. During these observations, Mrs. Lynn's strategy to improve Korey's engagement and

behavior was to ask him to stop engaging in his disruptive behaviors (e.g., talking to peers, using

his cell phone).

     Deandre. Deandre was a 15-year-old Black male in his freshman year of high school.

When I interviewed Deandre, he answered all of the questions and engaged in a conversation,

but he looked in the opposite direction and never made eye contact. Deandre received an IEP

emotional disturbance earlier in the school year in which this study occurred, but he reported a

previous expulsion for bringing a weapon to school and that he missed extended periods of

school to receive mental health services. He also stated that he was unaware of his IEP behavior

goals, or if he had any. Deandre was raised in the foster care system and stated that he had previously attended a lot of different schools. He said that he does best in small self-contained classes where he can receive focused attention from the teacher. He also reported that he has trouble focusing in class, and Mrs. Lynn verified that he frequently talks to his friends and tries to make them laugh. Mrs. Lynn also reported that Deandre frequently missed school and was not passing any of his classes. Deandre scored in the very high range on the SDQ, and the FAST results indicated that the primary function of Deandre's behaviors were attention seeking from his peers, but he also scored high on escape behaviors. The FAST results indicated that Deandre was likely to display behaviors to seek attention from his classmates, or to avoid doing classwork. During the two confirmatory direct observations that I conducted in Mrs. Lynn's class before this study occurred, Deandre was academically engaged 0% and 13% of the class period, and he displayed respectful behavior 0% and 20% of the class period. During the first confirmatory direct observation, Deandre spoke to his peers the entire period and made disrespectful comments to the teacher when she attempted to redirect him. During these observations, Mrs. Lynn's strategy to improve Deandre's engagement and behavior was to ask him to stop engaging in his disruptive behaviors (e.g., talking to peers, using cell phone) and she reported that before the study began, she frequently kicked him out of class. Lastly, Deandre was expelled from school during the second intervention phase.

Ezekiel. Ezekiel was a 16-year-old Black male who was chronologically a sophomore but had freshman credits. He joined Mrs. Lynn's class in the second semester, and he was only passing his two English classes. Ezekiel was labeled with ADHD and stated that he always had behavioral problems in school, but he got his work done. He also reported that he did not know his IEP behavior goals, or if he had any. His favorite subject was English, and both he and his

teacher agreed that although he talks most of the class period, he completes roughly half of his work each day during Mrs. Lynn's English class. However, Mrs. Lynn said that his work is usually rushed and completed in the last several minutes of class. He reported that he gets distracted in class and that frequent reminders from the teacher to stay focused were the most effective intervention for him. Mrs. Lynn reported that Ezekiel is the most productive when he comes in for one-on-one tutoring with her during lunch, but he gets too distracted when his peers are around. Ezekiel scored in the very high range on the SDQ, and the FAST results indicated that the primary function of Ezekiel behaviors were attention seeking, but he also scored high on escape behaviors. The results of FAST suggested that Ezekiel primarily displayed behaviors to seek attention from his classmates, but he was also likely to display behaviors in an attempt to avoid classwork. During the two confirmatory direct observations that I conducted in Mrs. Lynn's class before the study occurred, Deandre was academically engaged 7% and 10% of the class period, and he displayed respectful behavior 6% and 18% of the class period. During these observations, Mrs. Lynn's strategy to improve Ezekiel's engagement and behavior was to ask him to stop engaged in his disruptive behaviors (e.g., talking to peers, using a cell phone). Lastly, Ezekiel was court ordered to attend rehab one day after completing his last intervention phase and was no longer enrolled in the school during the maintenance phase.

Noel. Noel was a 15-year-old Black male freshman in Mrs. Wilkinson's third-period math class. Noel was a basketball player who stated that he wants to pass his classes so that he can continue to play on the school's team. His father was a basketball coach at the school, and both of his parents were engaged in his education and wanted him to do well so that he can succeed in school and basketball. He was labled with a specific learning disability and received special education services in both math and English. Noel reported that he typically received

grades of Ds and some Cs. Mrs. Wilkinson reported that he almost failed her class the first semester, but with help from his parents he was able to pass, and he was receiving a D when this study began. Both Noel and Mrs. Wilkinson reported that Noel was slow to start work at the beginning of class, and when he did work, he stopped and talked to his friends when he got to a math problem that he did not understand. Noel scored in the high range on the SDQ, and the FAST results indicated that the primary function of Noel's behavior was attention seeking, but he also scored high on escape behavior. His FAST results indicated that he primarily displayed behaviors to seek attention from his classmates, but he was also likely to display behaviors that would result in him avoiding classwork. During the two confirmatory direct observations that I conducted in Mrs. Wilkinson's class before this study began, Noel was academically engaged 24% and 21% of the class period and displayed respectful behavior 32% and 36% of the class period. During these observations, Mrs. Wilkinson's strategy to improve Noel's engagement and behavior was to provide him with one-on-one support to help keep him focused on completing his assigned classwork.

Setting

I conducted this study in a public high school in a mid-size city in the Midwest that serves 9th - 12th grade students with and without disabilities. The high school had a total enrollment of 1,700 students, of whom 60% were from low-income families, and nearly 20% were receiving special education services. Mrs. Lynn's English class was designed for 9th and 10th grade students and had roughly 22 students, six of whom had IEPs. Mrs. Lynn had a special education teacher who assisted her twice a week for roughly 30 minutes, but the special education teacher typically completed paperwork and provided limited assistance to the students. Mrs. Wilkinson's math class was designed to be a 9th grade math class and had 33 students, five

of whom had IEPs. Mrs. Wilkinson also had a special education teacher assisting her twice a week; however, the special education teacher provided class-wide support and did not assist the special education students in particular.

Dependent Variable

I collected data on the dependent variables of academic engagement and respectful behavior. In accordance with recent self-monitoring intervention research (e.g., Bruhn et al., 2018), I focused on desired replacement behavior rather than undesirable target behavior. I defined academic engagement as any time the student was working on the assigned task, actively attending to the teacher, or was appropriately engaged in a teacher-directed conversation. Examples of academic engagement included independently working on the assigned task, independently reading the assigned material, participating in an academic discussion, task-appropriate talking, actively participating in group work, or hand-raising. Behaviors that did not meet the definition for academic engagement included when a student was not working on the assigned task, a student was not engaging in teacher-directed conversations, the student was working on materials that are not for the current class, or the student was using a cellphone. The definitions and examples of academic engagement were drawn from previous studies with a dependent variable of academic engagement or on-task behaviors (e.g., Bruhn et al, 2016; Chafouleas, 2011; Vogelgesang, Bruhn, Coghill-Behrends, Kern, & Troughton, 2016). The second dependent variable that I monitored was respectful behavior. I defined respectful behavior as verbal or nonverbal exchanges between the participant and a teacher or peer assigned to work with the participant, and behaviors compliant with the teacher's requests that did not disturb the learning environment. Examples of respectful behavior included social interactions that were academically focused, keeping hands to oneself,

using appropriate voice levels (i.e., not yelling), remaining silent while the teacher or peers were speaking, staying seated, and properly using classroom equipment (Lewis, Sugai, & Colvin, 1998). Interactions that did not meet the criteria for respectful behavior included talking with a peer outside one's assigned group, disturbing the learning of others (e.g., making noise by tapping or hitting desk, talking out of turn, touching another student), improperly using classroom equipment, using a cellphone, and arguing with teacher or peers. I modeled the definition of respectful behavior from the direct behavior rating scale definition of respectful behavior (Chafouleas, 2011; Chafouleas, Riley-Tillman, & Christ, 2009).

I used momentary time sampling to collect data on the dependent variables. Momentary time sampling is when an observer collects data at regular frequency counts (e.g., every 15 seconds; Kumar, 2014). Momentary time sampling is considered an accurate measurement of behavior that is likely to occur with high frequency (e.g., disruptive behavior, talking out of turn; Fiske & Delmolino, 2012). I conducted momentary time sampling in 15-second intervals by observing each student every 15-seconds and recording if they were displaying academic engagement and respectful behavior (see Appendix G). After each observation, I added the total number of occurrences the student displayed each dependent variable, and then I divided each by the total number of intervals that I observed, and then I multiplied each result by 100. I reported dependent variables of academic engagement and respectful behavior as the percent of intervals during an observational session in which each behavior occurred.

Each observation session lasted the length of a class period, which was 50 minutes four days a week, and 40 minutes one day a week. Lastly, I collected observational data during each class period to capture the contextual information. To capture this data, I took brief qualitative notes on what was occurring during each class that I observed (e.g., lecture, independent work,

group work). For instance, I would note if the first 5-minutes were an independent bell ringer, then 15-minutes of guided instruction, followed by 20-minutes of group work, and then 10 minutes of sharing out. Additionally, I tallied frequency counts on three teacher behaviors: (a) opportunities to respond, (b) praise, and (c) redirections directed towards the student participant. Lastly, I spoke to the teacher at the end of each class to determine the percentage of work the student completed during each class period.

A second graduate student observed at least 33% of the sessions for Korey, Ezekiel and Deandre, 25% the of sessions for Noel throughout each experimental phase of the study to calculate interobserver agreement (IOA) on the dependent variables and to monitor possible observer drift. (Heyman, Lorber, Eddy, & West, 2014; Kratochwill et al., 2010). Before the study began, the two observers met to discuss the definitions of the dependent variables, discuss examples and nonexamples, and review the data collection forms. The two observers then practiced by observing students without an IEP in one of the classrooms in which the study occurred, using the same data collection forms and in the same frequency (e.g., every 5-minutes). The practice sessions occurred during three periods that did not include any students who were participating in the study. The observers started stopwatches at the same time and then sat separately to ensure the observations were independent. A total of three practice observation sessions occurred to achieve a Cohen's Kappa agreement of over .8 for each of the practice observations (Cook et al., 2014). Inter-observer agreement was conducted across all phases of the study and for each participant. Both observers collected data for 35% of the baseline (A) sessions, 33% of the initial intervention (B) sessions, 33% of the withdrawal (A) sessions, and 42% of the reintroduction (B) sessions. Before each observational session, both observers read the definitions and examples of the behaviors together and discussed the participants and any

challenges associated observing each participant. I calculated interobserver agreement by using

Cohen's Kappa, which accounts for agreement between two observers that occurs due to chance

(Cohen, 1968). Kappa is scored from 0 to 1, with .4 or below indicating poor agreement, .4 to .6

indicating fair agreement, .6 to .75 indicating good agreement, and .75 or higher indicating

excellent agreement (Watkins & Pacheco, 2000). Kappa's ranged from a low of .81 to a high of

.96, with a mean of .88 and standard deviation of .05 across all IOA sessions. Had our Kappa

score fallen below .60 during the course of the study, a booster training session would have

occurred, but it was not needed during this study (Cook et al., 2014).

Social Validity

It is essential to obtain social validity feedback from the participants to determine the

extent to which the intervention addressed a socially important behavior, was feasible, and if the

participants would like to continue to use the intervention in the future (Ledford & Gast, 2018).

This study included several types of social validity measures to assess both the usability of the

intervention and to assess if the intervention was socially valid for reducing the targeted

behaviors. To measure social validity, I used the *User Profile Rating – Intervention Revised*

(URP-IR; Chafouleas, Briesch, Neugebeaur, & Riley-Tillman, 2011) and the *Children's Usage*

Profile Rating (CURP; Briesch & Chofouleas, 2009). The URP-IR was for teacher ratings and

uses a six-point rating scale with 29 questions that have Likert scale responses ranging from 1

(strongly disagree) to 6 (strongly agree). The CRUP rating form uses a four-point rating scale

with 24 questions with a Likert scale ranging from 1 (I totally disagree) to 4 (I totally agree).

Both of these assessments were validated measures and provided both the teachers and students

and opportunity to provide standardized feedback related to social validity (Briesch et al., 2009;

Briesch, Casale, Grosche, Volpe, & Hennemann, 2017; Chafouleas et al., 2011). Additionally, I

also provided the teachers with the *Intervention Rating Profile-15* (IRP-15; Witt & Elliot, 1985) pre- and post-intervention to rate the interventions social validity. This rating focused on the social aspects of improving the targeted outcomes, acceptability, and appropriateness. The rating consisted of 15 questions that were answered with a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Research Design

I used a single-case ABAB withdrawal design with a maintenance phase to evaluate whether there was functional relation between the electronic (MoBeGo) self-monitoring intervention and each of the dependent variables (Baer, Wolf, & Risley, 1968). A withdrawal design represents the clearest and most convincing demonstration of a functional relation because it requires a repeated introduction and withdrawal of an intervention (Gast & Ledford, 2014). By repeatedly manipulating experimental conditions, researchers utilizing an ABAB design can demonstrate experimental control through repeated manipulation of the independent variable to provide evidence that intervention is the most plausible explanation of the change in the dependent variable (Kazdin, 2011). In this ABAB single-case research study, each student was an independent single-case research study. Therefore, the starting dates were not consistent across participants. For instance, participant four started three weeks after participant one. Using a withdrawal design was also advantageous because students with elevated levels of externalizing behavior were likely to face disciplinary action and miss school (Vaughn et al., 2011). Although withdrawal designs may present an ethical concern due to the withdrawal of a potentially effective intervention and a return of the externalizing behavior, I addressed these concerns by not unduly extending the withdrawal phase (e.g., beyond three stable data points).

Furthermore, using a withdrawal design was the most reliable singe-case method to determine a functional relation (Ledford & Gast, 2018).

This single-case ABAB research study consisted of five phases: baseline (A), intervention (B), withdrawal (A), intervention (B), and maintenance. In the baseline condition, the teachers and students continued to use the same classroom management strategies in place before the study. During the intervention phase, the teachers and students used the electronic self-monitoring intervention. Each phase was then repeated, and a maintenance phase occurred three weeks after each participant's second intervention phase ended. During the three weeks, the teachers used the intervention as they had during the study, with the same definitions and collected data at the same frequency. As established by Baer and colleagues (1968), each condition length was determined by data variability and continued until the data were stable. Based on data from single-case graphs in previous self-monitoring interventions, and quality standards established in the field of single-case research, a stability envelope was used to determine stability. A stability envelope was defined as three consecutive data within a 30% envelope of the mean score (Dooley, 2018; Ledford & Gast, 2018; Vogelgesang et al., 2016), and the student was eligible to transition to the next phase if either dependent variable met those standards. A stability envelope was drawn on each single-case graph to visually represent the 30% range of the mean level (Gast & Ledford, 2014). The students were able to progress to the next phase if the outlying data points are in the direction of the desired outcome. For example, if the researcher was monitoring academic engagement in the intervention phase, and a student had an outlier data point is in the therapeutic direction (i.e., the data point shows higher engagement than the others) the student was eligible to progress to the next phase. Additionally, in accordance with ethical considerations in single-case research, the students could transition to

second intervention phase if they displayed behaviors in the withdrawal conditions that were

unstable but significantly below their intervention data.

Independent variable

The electronic (MoBeGo) self-monitoring intervention was the independent variable in

this study (Bruhn et al., 2019). MoBeGo is an iPad application in which the teachers and students

share an iPad and rate academic engagement and respectful behavior in regular intervals (e.g.,

every 5-minutes). At the end of each interval, the teacher and student rated each dependent

variable of the academic engagement and respectful behavior on a 0-4 scale (0 = never, 1 =

rarely, 2 = sometimes, 3 = often, 4 = always). The teachers entered the results first, and then the

students. After the student entered his scores, the MoBeGo software displayed both scores so that

the teacher and student could see if they agreed. The self-monitoring software also graphed the

student's outcomes according to the student and teacher ratings at the end of each class and

continued updating the graph daily throughout the study. The graph displayed the student's

results with a goal line 10% above what the teacher recorded in the baseline condition. The

teacher and student also met at the end of each class to briefly review the data and discussed if

the student met their goal. I observed each of the discussions, but I did not participate or provide

input. During each of the phases described below, I was in charge of collecting, monitoring, and

distributing the iPads to prevent implementation outside of the study and to ensure that I

systematically manipulated the independent variable.

Pre-observation. I conducted two confirmatory direct observations before the study

began to confirm the student displayed elevated levels of externalizing behaviors that negatively

affected the students' academic engagement and respectful behavior (Van Acker, Grant, &

Henry, 1996). Each confirmatory observation took place in the same class that I observed during

the study and occurred for the duration of the class. During these observation sessions, I used the same data collection forms and techniques that I used during the study. Additionally, I collected data on the frequency of teacher praise, opportunities to respond, and redirects. Teacher praise was defined as "favorable verbal or nonverbal [teacher] attention" (Jenkins, Floress, & Reinke, 2015, p. 464), which indicates approval of student behavior (Moore et al., 2018). Examples of teacher praise include positive verbal statements acknowledging the student's academic or behavior, and nonverbal communications such as hand gestures, stickers, or written responses. Opportunities to respond were defined as student responses elicited by teacher behavior (Leahy, Miller, & Schardt, 2019). Examples of opportunities to respond include verbal, gesture, or written opportunities to respond that are provided by the teacher and can be individual or group responses (Leahy et al., 2019). Redirects were any time a teacher made a corrective statement directly to the participant. Examples of redirects include asking a student to put a phone away or asking a student to stop talking. I continued to collect data on each of the three teacher behaviors during each phase of the study.

Baseline condition. In the baseline condition, student participants continued to receive the behavioral management services the teacher in the classroom has been using throughout the school year. During this phase the teachers used the self-monitoring application to collect the students baseline data; the student participants did not track their behavior during this session and did were not informed of the teacher's daily results. Each participant remained in the baseline condition until they displayed stability for a minimum of three data points.

Treatment condition. Introduction of the self-monitoring intervention occurred after each participant achieved stability in the baseline condition and the student received training on how to use the self-monitoring software (see Appendix H). During the treatment condition, both

the teacher and the student entered the ratings in 5-minute intervals for both dependent variables using the MoBeGo self-monitoring software. At the end of each class period, the teacher and the student briefly met to discuss the data and the student's behavior during class as it relates to their goal, which was observed and documented with a fidelity checklist. Additionally, I documented the teacher and student agreement on ratings, and if they fall below 70% agreement, the teacher and student met to discuss why their ratings were different and to discuss the definitions of their target behaviors. The post class meetings provided the teacher with an opportunity to address the student behavior and to provide strategies for improving their outcomes the following day. Although the teachers were not instructed to review the target behaviors with the students before class, the teachers did occasionally remind the students of their goals and behaviors when the students entered the room. After a student reached the goal and demonstrated stability for a minimum of three data points, as previously described, then the student moved on to the withdrawal phase.

Withdrawal condition. After the students met their goals and displayed three stable data points above the goal in the treatment condition, the teacher stopped using the MoBeGo application with the students and returned to collecting data in the same format as the baseline condition. During the withdrawal condition, the teachers implemented the same behavior management strategies as in the baseline condition. The withdrawal condition only occurred one time per participant and continued until stability was reached. The students did not need to return to their baseline scores to end the withdrawal phase.

Return to intervention. Upon achieving stability in the withdrawal condition, the intervention was reinstated with the student. During this phase, each participant returned to the same intervention format used immediately before their withdrawal condition. For instance,

students continued to have the same goals and used the same definitions for their target behaviors of academic engagement and respectful behavior. Each participant remained in this phase until achieving a minimum of three stable data points.

Maintenance. Maintenance phases are utilized in single-case research to determine if the independent variable is maintaining its effect on the dependent variable (Ledford & Gast, 2018). Therefore, I returned to the classroom to observe the self-monitoring intervention three weeks after the end of the participant's last intervention phase. In the three weeks that I was not observing the intervention, the teacher and student continued to use the intervention. During the maintenance sessions that I observed, the student continued to use the intervention in the same format as the last phase of the study, and I collected data related to both the fidelity of implementation and outcomes on the same dependent variables, using the same data collection technique and forms. A flow chart of this study is visually displayed in figure 1.

Recruit teacher participants

↓

Teachers use SDQ to screen students

↓

Recruit Students Who Qualify

↓

Confirmatory Direct Observation

↓

Train Teacher and Complete FAST Form

↓

Baseline Phase

↓

Train Students with Teachers

↓

Intervention Phase

↓

Withdrawal Phase
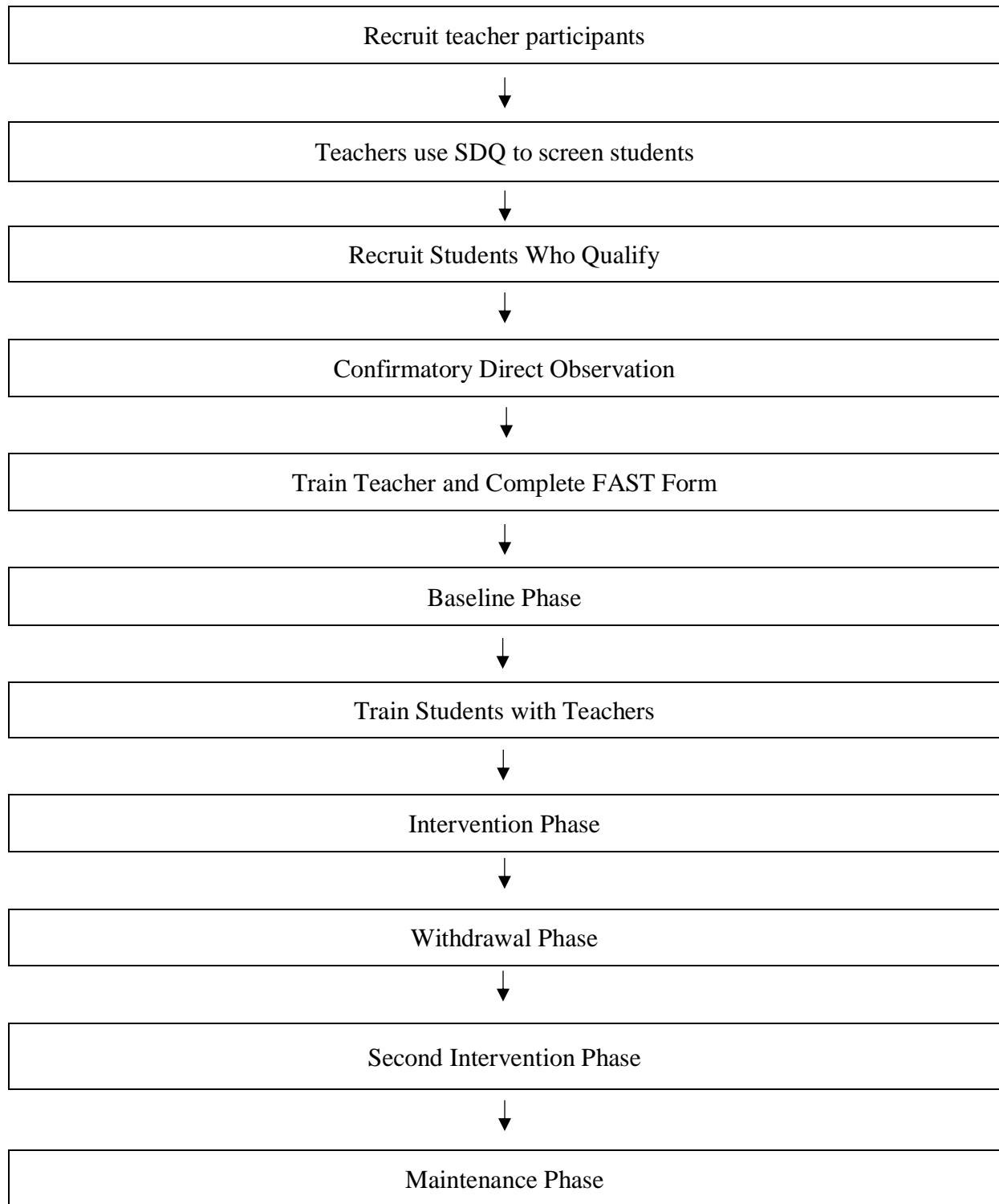
↓

Second Intervention Phase

↓

Maintenance Phase

Figure 1. Flow chart of research project.

Intensification process for nonresponders. If a student had not consistently reached the 10% above baseline goal for either dependent variable, or stability could not have been determined, there was a framework in place to intensify the intervention. To determine how to intensify the interventions, the teacher and student would have consulted with the researcher and reviewed the SDQ results, FAST results, and student and teacher knowledge of the behaviors. If the student's behaviors were attention seeking or access to activities, then the intervention would have been intensified by either reducing the interval lengths or providing a contingent reinforcement, because both of those components provide additional attention and access. If the highest score was escape, the dependent variable would have been intensified by first lowering the goal to aid the student in avoiding escape.

Treatment fidelity. Treatment fidelity is critical in single-case experimental designs because the independent variable is applied over time and is expected to be continuously monitored across phases (Horner et al., 2005). To monitor treatment fidelity, I completed a fidelity monitoring rating scale (see Appendix I) after each observation. The observation form was modified from Vogelgesang and colleagues (2016) and allowed me to monitor the teacher and student to assess if they are using each of the electronic self-monitoring intervention components during the observed academic activities with fidelity. At the end of each observation period, I rated whether the teacher and student used the intervention in 5-minute intervals, if they met to discuss the observation period, and if all components of the intervention were properly used. The total number of points earned was divided by the total possible points (10) and then multiplied by 100 to determine fidelity percentages.

Intervention training. Electronic self-monitoring software is designed to be user-friendly, intuitive, and not require extensive training for either teachers or students (Bruhn et al.,

2017), but training was required to teach the concept of using self-monitoring to improve behavior and on how to use the electronic self-monitoring software. Researchers using electronic self-monitoring interventions have typically reported that teacher training requires roughly one hour, and student training can be conducted in half an hour (Bruhn et al., 2017; Dooley, 2017). In this study, I provided the teachers and students with training to help them gain a better understanding of self-monitoring interventions and how to use the MoBeGo self-monitoring application. The teachers and students had their training sessions together during lunch periods after the baseline condition. In the first training session (see Appendix J), I reviewed the purpose of the study, explained self-monitoring, and single-case research design to ensure the independent variable would not be changed without first consulting with myself. I then presented the positively stated definitions of academic engagement and respectful behavior and examples of both. The teachers and students were then given examples of both and answered if they thought the example was either academic engagement or respectful behavior. Next, the teacher and student provided examples of academic engagement and respectful behavior that they thought applied to their classroom settings and behavior. I began the second part of the training by reviewing the SDQ, FAST, and baseline data with the teacher and student. We then discussed the data and determined exactly how we wanted to positively state the dependent variables of academic engagement and respectful behavior to fit both the student needs and the contextual variables of the class. I then trained the teachers and students how to use the self-monitoring MoBeGo application. Lastly, the teacher and student practiced using the application by acting and discussing how they would rate behaviors. The teacher and student continued practicing and discussing until they reached 80% agreement.

Data Analysis

Data collection. Every 15-seconds I used the data collection form to mark if the target student was displaying academic engagement and respectful behavior. The momentary time sampling data that I collected was graphed in a single-case format and analyzed for this study. In the graphs, the Y-axis was the percentage of occurrences in which the dependent measure occurred, and the X-axis was the number of the session. I conducted a formative analysis within each phase to determine when stability was reached, and if the participant could change phases. At the conclusion of the study, I conducted a summative analysis to examine the presence of a functional relation between the independent and dependent variables using visual analysis techniques. several effect size measures were conducted to assess the effect of the intervention.

Visual. A within phase formative visual analysis occurred during each phase of this study to make decisions related to changing phases or intensifying an intervention. Each phase continued until stability was reached within the condition, as previously defined. In accordance with ethical considerations of single-case research, each student could transition phases in the baseline and withdrawal conditions if their data were not stable but low enough to indicate that an intervention was required (Gast & Ledford, 2014). Additionally, a split-middle method to provide an estimate of trend within conditions and for trend analysis.

I also conducted a summative visual analysis at the conclusion of the study to assess the extent to which there was a functional relation between the intervention and the dependent variables. To do this, I assessed the variability, level, trend, overlap, and change in data between adjacent conditions. I calculated the relative level change between adjacent conditions by a) identifying the median value of the first half of a phase and comparing and second half of adjacent conditions, b) subtracting the smallest value from the largest value, and c) determining if it is an improvement or deterioration (Gast & Ledford, 2014). Additionally, visual analysis

was implemented to calculate the percent of non-overlapping data (PND). Between condition PND was calculated by a) determining the range of data point values from the first condition, b) counting the number of data points in the second condition, c) counting the data points in the second condition that are outside the range of the first condition, and d) dividing the number of data points that fall outside of the range of the first condition by the total number of data points in the second condition and multiplying by 100 (Scruggs & Masterpieri, 1998).

Effect sizes. Calculating an effect size provides a quantitative index that estimates the meaningfulness of change associated with an intervention (Vannest & Ninci, 2015). To provide an estimate of the effect size of the self-monitoring intervention used in this study, I calculated four effect sizes. First, I calculated Tau-u, which is a statistical formula that combines within condition analysis of trend and non-overlapping data to provide an effect size and helps control for undesirability of phase A trend (Parker, Vannest, Davis, & Sauber, 2011). Tau-u is calculated by subtracting Kendall's S statistic calculated for baseline trend from Kendall's S statistic for calculated for comparison between phases and dividing it by the number of observations in the baseline phase multiplied by the number of observations in the intervention phase (Parker et al., 2011). Second, I calculated the improvement rate difference (IRD), which is an effect size measurement with an evidence base in medical research that is increasingly being used in educational research (Parker, Vannest, & Brown, 2009). Parker and colleagues (2009) defined IRD as and the improvement rate in the treatment phase(s), minus the improvement rate in the baseline phase(s). The improvement rate is the number of datum points in a phase that do overlap with a datum point in the comparison phase. A score of 1.0 would indicate that all of the data points in the intervention phases improve, while a score of .50 indicates that half improved and indicates there is only a chance level of improvement, and a score of .70 or above is typically

considered effective (Parker et al., 2009). Third, I calculated a standardized mean difference

(SMD) effect size, which is a recently developed effect size calculation for single-case that is

similar to Cohen's *d* in group design research (Hedges, Pustejovsky, & Shadish, 2012). An SMD

effect size also allows for single-case data to be meta-analyzed with group designs, which is

valuable when trying to determine if an intervention is evidence-based (Valentine, Tanner-Smith,

Pustejovsky, & Lau, 2016). Lastly, I calculated log response ratio (LRR), which is an effect size

measure for single-case data with behavioral outcomes that quantifies the degree of treatment

effects in terms of proportionate change in the level of an outcome (Pustejovsky, 2015).

IV. RESULTS

The purpose of this study was to determine if an electronic (MoBeGo) self-monitoring intervention improved academic engagement and respectful behavior for high school students with high incidence disabilities who also demonstrated externalizing behavior problems in general education classrooms. I used a single-case research design with four participants to address the three research questions that guided this study. The results are aligned with each of the three research questions below.

Effects of Self-Monitoring for High-School Students with High Incidence Disabilities and Elevated Levels of Externalizing Behavior

The first research question focused on assessing a functional relation between the electronic self-monitoring intervention and the dependent variables of academic engagement and respectful behavior. I used visual analysis procedures to inspect the level, trend, and variability of each participant's data to determine the functional relation between the independent and dependent variables. The visual analysis suggested a functional relation between the electronic intervention and the dependent variables of academic engagement and respectful behavior for the three participants who completed the study. The fourth participant, Deandre, was suspended before I could not obtain a sufficient number of demonstrations in the final intervention condition (i.e., a third data point) to determine a functional relation (Ledford & Gast, 2018).

Korey

Korey was a 17-year-old freshman in Mrs. Lynn's English class who frequently used his phone and spoke to his peers during class. Figure 2 illustrates the percentage of intervals in which Korey displayed academic engagement, and Figure 3 illustrates the percentage of intervals in which Korey displayed respectful behavior. Korey missed a total of six sessions. He missed

each of the sessions because either he or his child was sick. Additionally, Korey moved and

changed schools after the end of the reintroduction phase; therefore, I could not collect

maintenance data.
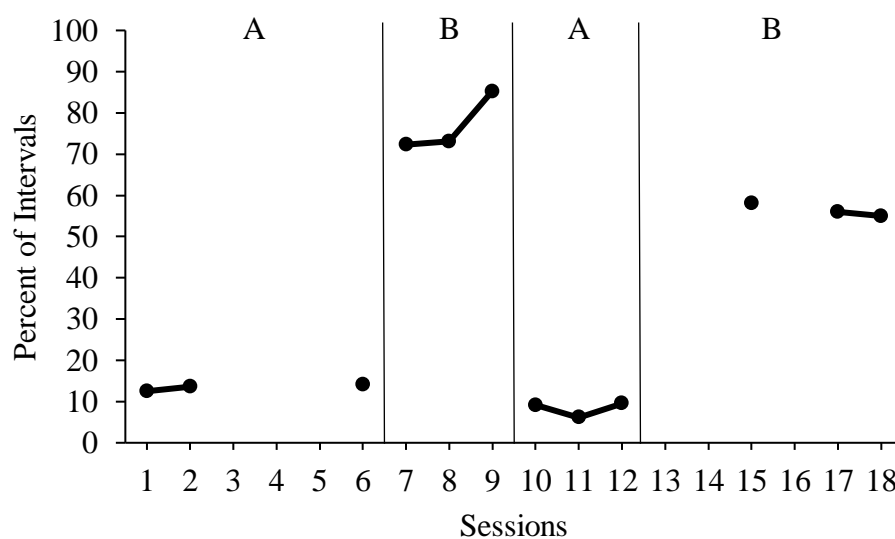
Figure 2. Korey's percent of intervals displaying academic engagement. A = Baseline phase, B = Intervention phase.
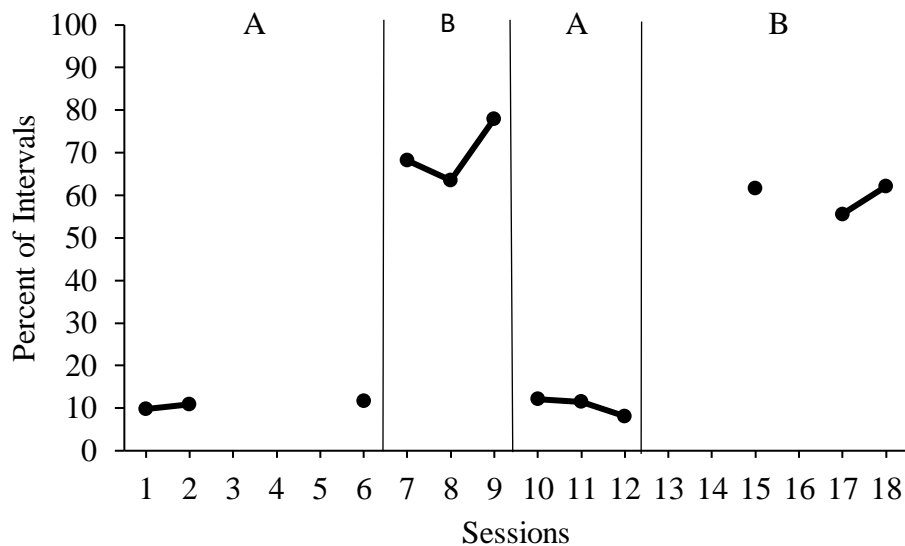
Figure 3. Korey's percent of intervals displaying respectful behavior. A = Baseline phase, B = Intervention phase.

level. There was an immediate and abrupt change in level between each condition for Korey's academic engagement and respectful behavior. Table 3 displays the mean, median, and relative level change between each condition for both dependent variables. Each of the relative level changes was in the hypothesized direction.

Table 3

Level and Relative Change for Korey

Dependent Variable	Phase	*m*	*Median*	Relative Level Change
Academic Engagement	Baseline (A)	13.4%	13.6%	
	Intervention (B)	76.9%	73.1%	+59.5
	Withdrawal (A)	8.2%	9.1%	-64.0
	Reintroduction (B)	56.0%	55.6%	+43.5
Respectful Behavior	Baseline (A)	10.8%	10.9%	
	Intervention (B)	69.9%	68.2%	+57.3
	Withdrawal (A)	10.6%	11.5%	-56.7
	Reintroduction (B)	59.8%	61.7%	+50.2

Note. *m* = mean

trend. A split-middle trend analysis was used to analyze trend within conditions. Analysis of Korey's academic engagement data revealed an accelerating (1.6%) therapeutic trend in baseline (A), an accelerating (13%) therapeutic in the intervention (B) phase, an accelerating (0.4%) therapeutic trend in the withdrawal (B) condition, and a decelerating (27%) non-therapeutic trend in the reintroduction (B) phase. Analysis of Korey's respectful behavior data revealed an accelerating (1.9%) therapeutic trend in baseline (A), an accelerating (9.8%) therapeutic in the intervention (B) phase, a decelerating (4%) non-therapeutic trend in the withdrawal (B) phase, and an accelerating (0.5%) therapeutic trend in the reintroduction (B) phase.

variability. Analysis of the academic engagement phases revealed that Korey's data in the baseline, intervention, and reintroduction phases were within the 30% stability envelope of the mean, indicating low variability. The final datum for the withdrawal phase was 0.1% above the upper limit of the stability envelope in the therapeutic direction. Analysis of the respectful behavior phases also revealed that the baseline, intervention, and reintroduction phases were within the 30% stability envelope of the mean, indicating low variability. The final datum for the withdrawal phase was 0.9% below the upper limit of the stability envelope in the non-therapeutic direction.

effect size analysis. Table 4 presents the results of the effect size analyses for Korey. The PND associated with both academic engagement and respectful behavior indicated that there was no overlap between baseline and intervention conditions. Likewise, the IRD demonstrated that all of the data points in the intervention conditions improved on the data from the baseline conditions, indicating a large effect. The Tau-u also indicated a strong effect size for both dependent variables. Korey's within-case SMD effect size suggested that the intervention had a

large effect on both dependent variables. Lastly, Korey's LRR effect size measure indicated that the intervention had a positive impact on the dependent variables.

Table 4

Effect Size Calculations for Korey

	PND	IRD	SMD (95% CI)	Tau-u	LRR (95% CI)
Academic Engagement	100%	1.0	37.62 (17.02 – 67.09)	0.78	1.83 (1.64 – 2.03)
Respectful Behavior	100%	1.0	30.83 (13.65 – 54.26)	1.00	1.80 (1.60- 2.00)

Note. PND = Percentage of non-overlapping data, IRD = Improvement rate different, SMD = Standardized mean difference, LRR = Log response ratio.

classwork. The teacher estimated the percent of classwork completed at the end of each session. Korey completed a mean of 7% (range = 0% - 10%) of his classwork during baseline and 13% (range 10% - 20%) in the withdrawal phase. During the intervention and reintroduction phases, Korey completed a mean of 87% (range = 70% - 100%) and 78% (range = 55% - 100%), respectively. The results indicated a mean improvement of 73% of classwork completed in the intervention conditions.

Ezekiel

Ezekiel was a 16-year-old freshman in Mrs. Lynn's English class who often spoke to his peers and had trouble staying focused on his school work. Figure 4 illustrates the percentage of intervals in which Ezekiel displayed academic engagement and figure 5 illustrates the percentage of intervals in which Ezekiel displayed respectful behavior. Ezekiel missed a total of two sessions. He missed session four due to holdup and session 14 due to being sick. Additionally, Ezekiel was moved to an alternative education program in a substance abuse facility before I collected maintenance data.
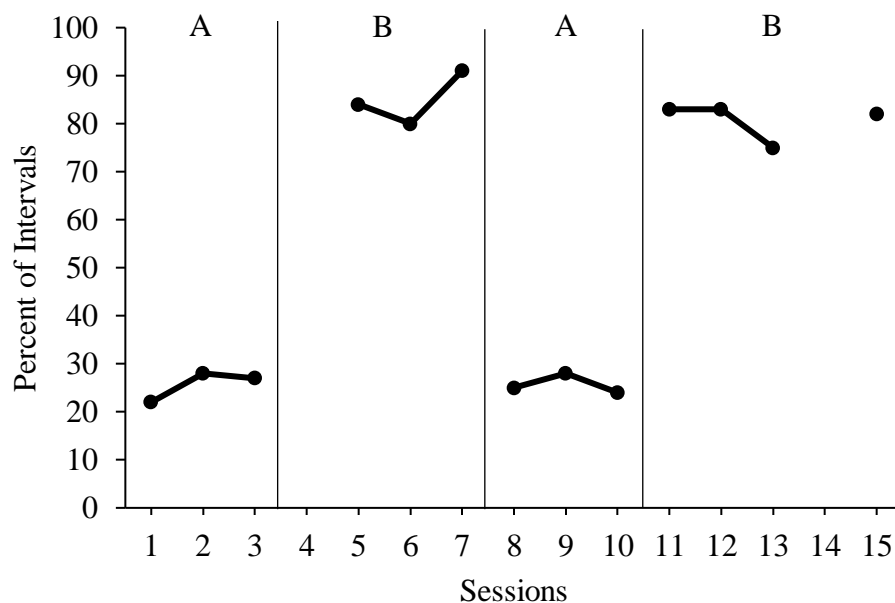
Figure 4. Ezekiel's percent of intervals displaying academic engagement. A = Baseline phase, B = Intervention phase.
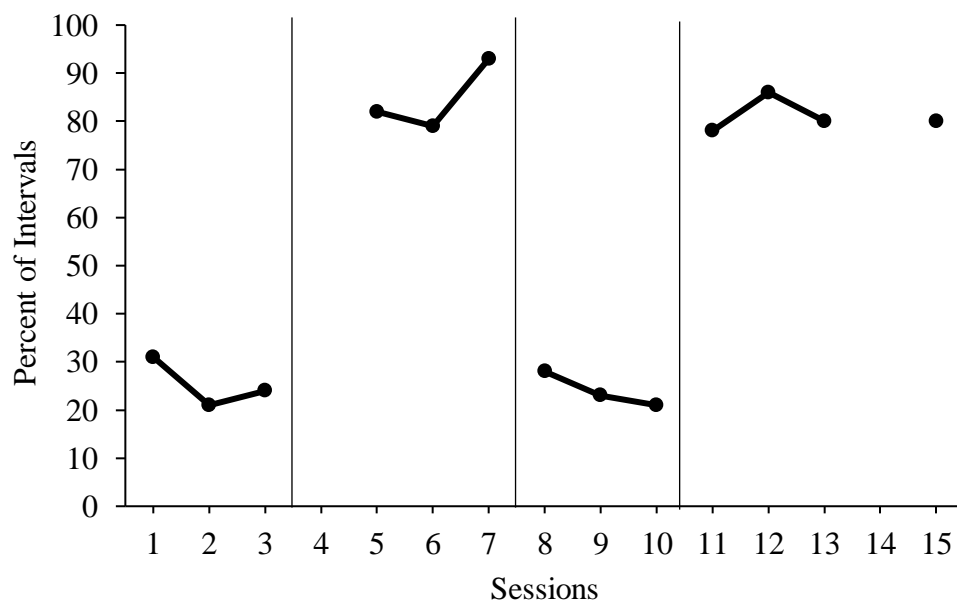

Figure 5. Ezekiel's percent of intervals displaying respectful behavior. A = Baseline phase, B = Intervention phase.

level. There was an immediate and abrupt change in level between each condition for Ezekiel's academic engagement and respectful behavior. Table 5 displays the mean, median, and relative level change between each condition for both dependent variables. Each of the relative level changes was in the hypothesized direction.

Table 5

Level and Relative Change for Ezekiel

Dependent Variable	Phase	*m*	*Median*	Relative Level Change
Academic Engagement	Baseline (A)	26.5%	27.8%	
	Intervention (B)	85.6%	84.1%	+56.3
	Withdrawal (A)	25.7%	25.0%	-59.1
	Reintroduction (B)	80.6%	82.3%	+57.3
Respectful Behavior	Baseline (A)	25.8%	24.4%	
	Intervention (B)	85.1%	82.4%	+58.0
	Withdrawal (A)	24.3%	23.3%	-59.1
	Reintroduction (B)	81.1%	80.2%	+56.9

trend. A split-middle trend analysis was used to analyze trend within conditions. Analysis of Ezekiel's academic engagement data revealed an accelerating (5%) therapeutic trend in the baseline (A) condition, an accelerating (7.8%) therapeutic trend in the intervention (B) phase, a decelerating (0.6%) non-therapeutic trend in the withdrawal (A) condition, and a decelerating (1.0%) non-therapeutic trend in the reintroduction (B) condition. Analysis of Ezekiel's respectful behavior data revealed a decelerating (6.7%) non-therapeutic trend in the baseline (A) condition, an accelerating (11.5%) therapeutic trend the intervention (B) phase, a decelerating (7.0%) non-therapeutic trend in the withdrawal (B) phase, and an accelerating (1.8%) therapeutic trend in the reintroduction (B) phase.

variability. Analysis of the academic engagement phases revealed that Ezekiel's data in each phase were within a 30% envelope of the mean, indicating low variability. Analysis of the respectful behavior phases revealed that data in the intervention and reintroduction phases were within the 30% stability envelope of the mean, indicating low variability. The initial datum for the baseline and withdrawal phases were above the upper limit of the stability envelope in the therapeutic direction.

effect sizes. Table 6 presents the results of the effect size analyses for Ezekiel. The PND associated with both academic engagement and respectful behavior indicated that there was no overlap between baseline and intervention conditions. Likewise, the IRD demonstrated that all of the data points in the intervention conditions improved on the data from the baseline conditions, indicating a large effect. The Tau-u also indicated a strong effect size for both dependent variables. Ezekiel's within-case SMD effect size suggested that the intervention had a large effect on both dependent variables. Lastly, Ezekiel's LRR effect size measure indicated that the intervention had a positive impact on the dependent variables.

Table 6

Effect Sizes for Ezekiel

	PND	IRD	SMD (95% CI)	Tau-u	LRR (95% CI)
Academic Engagement	100%	1.0	16.33 (6.80 – 26.38)	0.99	1.17 (1.04 – 1.30)
Respectful Behavior	100%	1.0	9.95 (4.08 – 16.07)	1.18	1.21 (1.00 – 1.42)

Note. PND = Percentage of non-overlapping data, IRD = Improvement rate different, SMD = Standardized mean difference, LRR = Log response ratio.

classwork. The teacher estimated the percent of classwork completed at the end of each session. Ezekiel completed a mean of 43% (range = 30% - 50%) of his classwork during baseline

and 66% (range 50% - 60%) in the withdrawal phases. During the intervention and

reintroduction phases, Ezekiel completed a mean of 90% (range = 70% to 100%) and 91% (range

= 75% - 100%), respectively. The results indicated a mean improvement of 41% of classwork

completed in the intervention conditions.

Noel

Noel was a 15-year-old freshman in Mrs. Wilkinson's math class who often spoke to his

peers instead of doing his classwork. Figure 6 illustrates the percentage of intervals in which

Noel displayed academic engagement and figure 7 illustrates the percentage of intervals in which

Noel displayed respectful behavior. Noel did not miss any observation sessions.
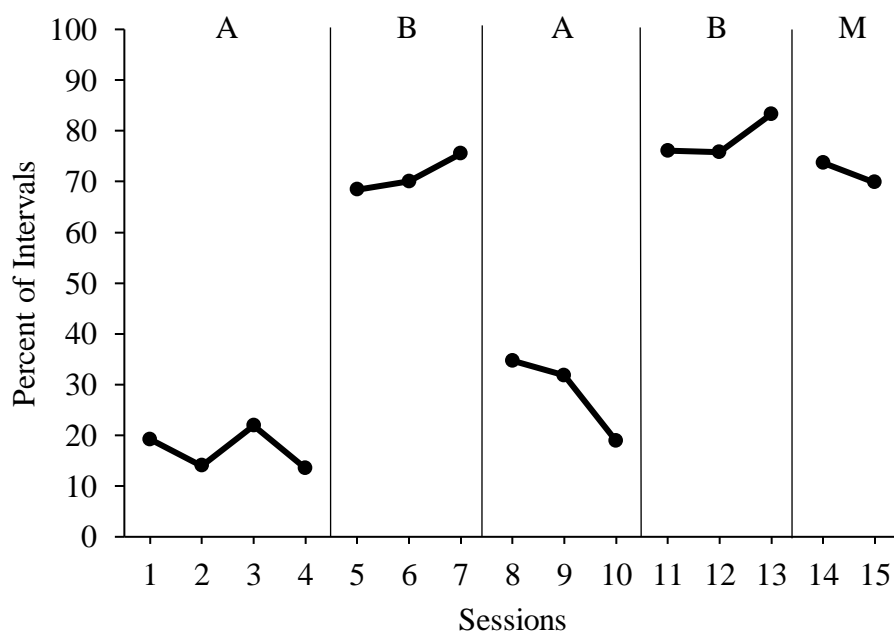
Figure 6. Noel's percent of intervals displaying academic engagement. A =
Baseline phase, B = Intervention phase, M = Maintenance phase.
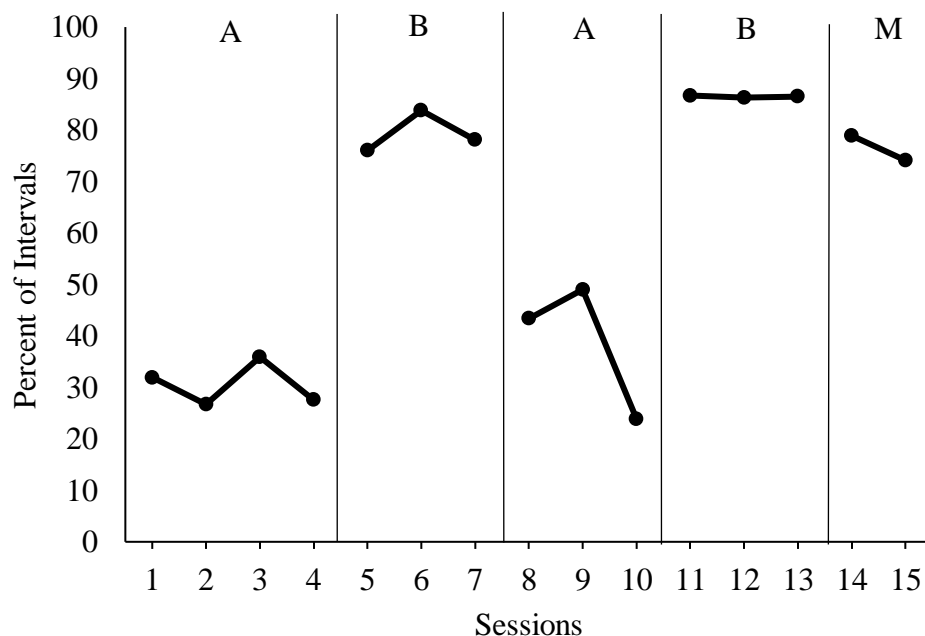
Figure 7. Noel's percent of intervals displaying respectful behavior. A = Baseline phase, B = Intervention phase, M = Maintenance phase.

level. There was an immediate and abrupt change in level between each condition for Noel's academic engagement and respectful behavior. Table 7 displays the mean, median, and relative level change between each condition for both dependent variables. Each of the relative level changes were in the hypothesized direction. Noel's maintenance data indicate relative level change of 10.0 for Noel's respectful behavior and 4.6 for academic engagement.

Table 7

Level and Relative Change for Noel

Dependent Variable	Phase	*m*	*Median*	Relative Level Change
Academic Engagement	Baseline (A)	17.2%	16.6%	
	Intervention (B)	71.3%	70.0%	+53.4
	Withdrawal (A)	28.5%	31.8%	-38.2
	Reintroduction (B)	78.4%	76.1%	+72.3
Respectful Behavior	Baseline (A)	30.5%	29.7%	
	Intervention (B)	79.3%	78.1%	+48.4
	Withdrawal (A)	38.7%	43.4%	-34.7
	Reintroduction (B)	86.5%	86.5%	+43.1

Note. *m* = mean

   trend. A split-middle trend analysis was used to analyze trend within conditions. Analysis of Noel's academic engagement data revealed a decelerating (5.7%) non-therapeutic trend in the baseline (A) condition, an accelerating (7.1%) therapeutic trend in the intervention (B) phase, a decelerating (15.8%) non-therapeutic trend in the withdrawal (A) condition, and an accelerating (7.2%) therapeutic trend in the reintroduction (B) condition. Analysis of Noel's respectful behavior data revealed a decelerating (4.3%) non-therapeutic trend in the baseline (A) condition, an accelerating (4.3%) therapeutic trend the intervention (B) phase, a decelerating (19.5%) non-therapeutic trend in the withdrawal (B) phase, and a decelerating (0.2%) non-therapeutic trend in the reintroduction (B) phase.

   variability. Analysis of the academic engagement phases revealed Noel's data in the intervention and reintroduction phases were within the 30% stability envelope of the mean, indicating low variability. Both baseline and withdrawal phases had one datum above the upper limit of the stability envelope in the therapeutic direction. Similarly, analysis of the respectful behavior phases also revealed that the intervention and reintroduction phases were within the 30% stability envelope of the mean contained low variability. A datum was above the upper limit

of the stability envelope in in the therapeutic direction in both the baseline and withdrawal phases.

     effect sizes. Table 8 presents the results of the effect size analyses for Noel. The PND associated with both academic engagement and respectful behavior indicated that there was no overlap between baseline and intervention conditions. Likewise, the IRD demonstrated that all of the data points in the intervention conditions improved on the data from the baseline conditions, indicating a large effect. The Tau-u also indicated a strong effect size for both dependent variables. Noel's within-case SMD effect size suggested that the intervention had a large effect on both dependent variables. Lastly, Noel's LRR effect size measure indicated that the intervention had a positive impact on the dependent variables

Table 8

Effect Sizes for Noel

	PND	IRD	SMD (95% CI)	Tau-u	LRR (95% CI)
Academic Engagement	100%	1.0	7.46 (3.47 – 12.74)	0.99	1.21 (0.95 – 1.51)
Respectful Behavior	100%	1.0	5.92 (2.88 – 10.66)	1.18	.87 (0.64 – 1.13)

Note. PND = Percentage of non-overlapping data, IRD = Improvement rate different, SMD = Standardized mean difference, LRR = Log response ratio.

     classwork. The teacher estimated the percent of classwork completed at the end of each session. Noel completed a mean of 40% (range = 20% - 60%) of his classwork during baseline and 67% (range 33% - 100%) in the withdrawal phase. During the intervention and reintroduction phases, Noel completed a mean of 90% (range = 80% to 100%) and 90% (range = 80% - 100%), respectively. The results indicated a mean improvement of 38% of classwork completed in the intervention conditions.

Deandre

Deandre was a 15-year-old freshman in Mrs. Lynn's English class who often walked around class, spoke to his peers, and struggled to focus on his classwork. He was expelled from school before a sufficient number of potential demonstrations of effect in the final intervention condition (i.e., three data points); therefore, experimental control was not established to determine a functional relation. As a result, Deandre's graphs and data are presented solely for descriptive purposes. Figure 8 illustrates the percentage of intervals in which Deandre displayed academic engagement and figure 9 illustrates the percentage of intervals in which Deandre displayed respectful behavior. Deandre missed a total of 10 sessions. All of Deandre's absences were due to suspensions for disruptive behavior outside of Mrs. Lynn's class or refusal to attend school after completing his suspension.
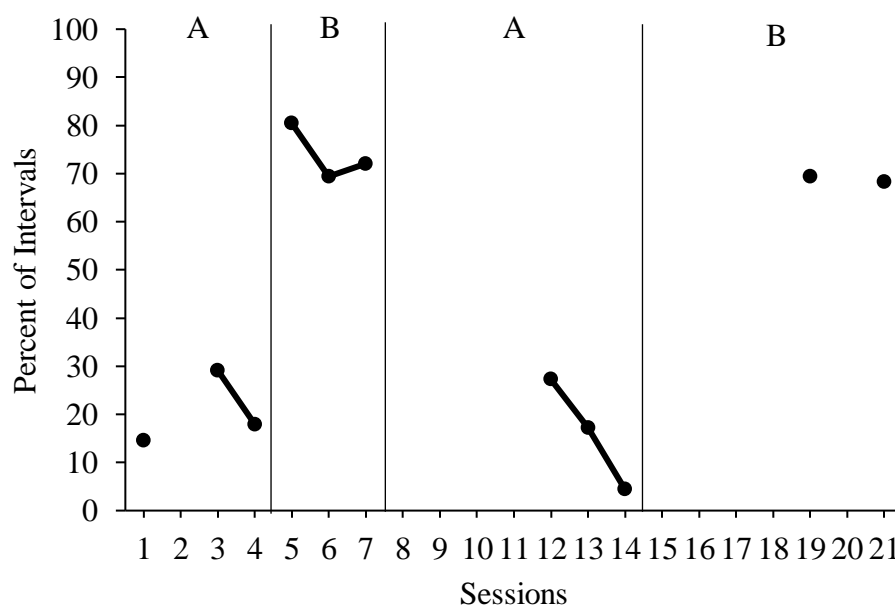
Figure 8. Deandre's percent of intervals displaying academic engagement. A = Baseline phase, B = Intervention phase.
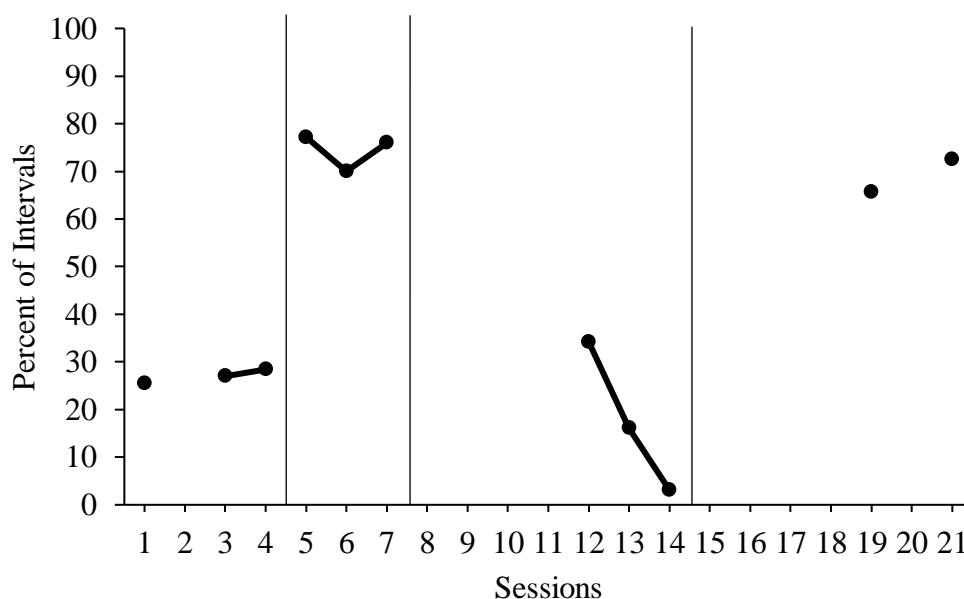
Figure 9. Deandre's percent of intervals displaying respectful behavior. A = Baseline phase, B = Intervention phase.

level. There were an immediate and abrupt change in levels between each condition for Deandre's academic engagement and respectful behavior. Table 9 displays the mean, median, and relative level change between each condition for both dependent variables. Each of the relative level changes was in the hypothesized direction.

Table 9

Level and Relative Change for Deandre

Dependent Variable	Phase	*m*	*Median*	Relative Level Change
Academic Engagement	Baseline (A)	20.5%	17.9%	
	Intervention (B)	73.9%	72.0%	+54.1
	Withdrawal (A)	16.3%	17.2%	-54.8
	Reintroduction (B)	68.9%	68.9%	+51.7
Respectful Behavior	Baseline (A)	26.8%	27.7%	
	Intervention (B)	74.4%	76.0%	+48.3
	Withdrawal (A)	17.8%	16.1%	-59.9
	Reintroduction (B)	69.1%	69.1%	+53.0

Note. *m* = mean

   trend. A split-middle trend analysis was used to analyze trend within conditions. Analysis of Deandre's academic engagement data revealed an accelerating (3.4%) therapeutic trend in the baseline (A) condition, a decelerating (8.4%) non-therapeutic trend in the intervention (B) phase, a decelerating (22.8%) non-therapeutic trend in the withdrawal (A) condition, and a decelerating (1.1%) non-therapeutic trend in the reintroduction (B) condition. Analysis of Deandre's respectful behavior data revealed an accelerating (3.4%) therapeutic trend in the baseline (A) condition, an decelerating (1.2%) non-therapeutic trend the intervention (B) phase, a decelerating (31.1%) non-therapeutic trend in the withdrawal (B) phase, and an accelerating (6.8%) therapeutic trend in the reintroduction (B) phase.

   variability. Analysis of the academic engagement phases revealed Deandre's data in the intervention and reintroduction phases were within the 30% stability envelope of the mean, indicating low variability. Both baseline and withdrawal phase had one datum above the upper limit of the stability envelope in the therapeutic direction. Analysis of the respectful behavior phases revealed that the baseline, intervention, and reintroduction phases were within the 30% stability envelope of the mean indicating low variability. The withdrawal phase had a datum both above and below the limit of the stability envelope.

   effect sizes. Table 10 presents the results of the effect size analyses for Deandre. The PND associated with both academic engagement and respectful behavior indicated that there was no overlap between baseline and intervention conditions. Likewise, the IRD demonstrated that all of the data points in the intervention conditions improved on the data from the baseline conditions, indicating a large effect. The Tau-u also indicated a strong effect size for both dependent variables. Deandre's within-case SMD effect size suggested that the intervention had

a large effect on both dependent variables. Lastly, Deandre's LRR effect size measure indicated

that the intervention had a positive impact on the dependent variables

Table 10

Effect Sizes for Deandre

	PND	IRD	SMD (95% CI)	Tau-u	LRR (95% CI)
Academic Engagement	100%	1.0	4.22 (1.63 – 6.98)	1.19	1.31 (0.71 – 1.94)
Respectful Behavior	100%	1.0	13.09 (6.91 – 26.90)	1.08	1.12 (0.68 – 1.76)

Note. PND = Percentage of non-overlapping data, IRD = Improvement rate different, SMD = Standardized mean difference, LRR = Log response ratio.

classwork. The teacher estimated the percent of classwork completed at the end of each

session. Deandre completed a mean of 27% (range = 20% - 30%) of his classwork during

baseline and 27% (range 10% - 40%) in the withdrawal phase. During the intervention and

reintroduction phases, Deandre completed a mean of 87% (range = 80% to 90%) and 90% (range

= 80% - 100%), respectively. The results indicated a mean improvement of 61% of classwork

completed in the intervention conditions.

Teacher Implementation Fidelity

The second research question focused on the teacher's and student's ability to implement

the MoBeGo self-monitoring intervention with fidelity. To monitor this, I collected fidelity data

on 100% of all observations. Mrs. Lynn and her students (Korey, Ezekiel, and Deandre)

implemented the intervention with 97.5% fidelity (range = 90% - 100%). On two occasions Mrs.

Lynn was unable to use the intervention every 5-minutes, and on another occasion, a student left

the room before Mrs. Lynn could discuss the daily results. Mrs. Lynn and her students entered

the same MoBeGo rating for the dependent variables 76.5% of the time (range = 44% - 93%).

During the first intervention session, Deandre rated himself a "4" every time until Mrs. Lynn spoke to him, resulting in the 44% agreement. All other disagreements occurred when the students rated themselves one score higher than Mrs. Lynn. Mrs. Wilkinson and her student (Noel) implemented the intervention with 96.1% fidelity (range = 90% - 100%). Every time Mrs. Wilkinson did not implement with 100% fidelity, it was because she did not use the MoBeGo application every 5-minutes. Mrs. Lynn and Noel entered the same MoBeGo rating for the dependent variables 85.3% of the time (range = 75% - 94%). All of their disagreements occurred when Noel entered a higher score than Mrs. Lynn.

I also collected descriptive data on the teacher behaviors of (a) opportunities to respond, (b) praise statements, and (c) redirects. Table 11 displays the mean rate and standard deviation of each behavior across phases. The purpose of the description data is to provide a more detailed data related to what was occurring in the classes during the baseline and interventions phases. Mrs. Lynn had three students in one class and some of the behaviors were occasionally class wide (e.g., opportunities to respond); therefore, her behaviors are reported as an average across her three student participants.

Table 11

Teacher Behaviors

	OTR		Praise		RD	
	M	SD	*M*	SD	*M*	SD
Mrs. Lynn						
Baseline	2.11	2.09	0.56	0.53	2.33	1.22
Intervention	6.00	5.48	1.67	1.00	2.44	1.42
Withdrawal	8.22	4.84	0.22	0.44	3.78	1.99
Reintroduction	2.33	2.40	0.78	0.73	2.22	1.86
Mrs. Wilkinson						
Baseline	7.25	3.59	0.50	0.58	1.00	1.41
Intervention	4.00	4.00	1.67	1.15	0.33	0.58
Withdrawal	0.00	0.00	0.67	0.58	0.67	0.58
Reintroduction	5.33	6.11	1.00	1.00	1.00	1.00

Note. OTR = Opportunities to respond, Praise = Praise statements, RD = Redirect

Social Validity

The third research question focused on student and teacher social validity measures of MoBeGo's efficacy and acceptability for continued implementation. The three students who finished the study completed the CURP (Briesch & Chafouleas, 2009). Both teachers completed the URP-IR (Chafouleas et al., 2011) and the IRP-15 (Witt & Elliot, 1985).

Student participants. The CURP is rated on a one to four Likert scale. Korey provided an average rating of 3.9, indicating high acceptability. Ezekiel provided an average rating of 3.85, indicating high acceptability. Noel provided an average rating of 2.95, indicating moderate acceptability. He scored each of the three subscales (personal desirability, feasibility, and understanding) in the moderate acceptability range.

Teacher participants. The IRP-15 is rated on a one to six Likert scale, with a maximum of 90 points. Mrs. Lynn rated the pre-intervention IRP 83 ($m = 5.53$) and post-intervention score 76 ($m = 5.06$) for Korey, each indicating high acceptability. She rated the pre-intervention score 78 ($m = 5.2$) and post-intervention score 77 ($m = 5.1$) for Deandre, each indicating high

acceptability. She rated the pre-intervention score 81 ($m = 5.40$) and the post-intervention 77 (m – 5.13) for Elijah, each indicating high acceptability. Mrs. Wilkinson rated the pre- and post-intervention IRP-15 as 90 ($m = 6$), indicating a perfect rating and high acceptability.

Additionally, both teachers completed the URP-I, which is rated on a one to six Likert scale. Mrs. Lynn completed one overall MoBeGo intervention rating. She gave an overall rating average of 4.65, which indicates high acceptability. All of her ratings were rated high besides the subscale of systems support, indicating that she may require support to implement this intervention. Mrs. Wilkinson gave an overall rating average of 6.0, indicating a perfect score and high acceptability.

V. DISCUSSION

In this study, I expanded upon previous research on self-monitoring by (a) focusing on high school students with disabilities who also displayed elevated levels of externalizing behavior, and (b) using an electronic (MoBeGo) self-monitoring intervention which incorporated several self-monitoring components (i.e., goal setting, graphing, teacher feedback). I also collected data on the teachers' and students' implementation fidelity, and I assessed the teachers' and students' perceptions of the social validity of the electronic (MoBeGo) self-monitoring intervention. As hypothesized, the electronic self-monitoring intervention demonstrated a positive functional relation with the dependent variables of academic engagement and respectful behavior for each of the student participants, was delivered with fidelity in a general education classroom, and was socially valid according to the teachers and students. The findings from this study can help guide future research and practice for high school teachers who work with students with high incidence disabilities who also display elevated levels of externalizing behavior. However, several contextual factors may have affected student outcomes, and several limitations should be considered when examining the results of this study.

Self-Monitoring for High School Students

The teachers in this study used an electronic (MoBeGo) self-monitoring intervention that was implemented with minimal training to improve students' academic and behavioral outcomes. The improvements in both academic engagement and respectful behavior displayed by each of the three students who completed the study suggest that there was a functional relation between the intervention and the improved outcomes; however, classroom level and individual variables may have also affected the outcomes. Additionally, each of the teacher and student participants entered the study with unique histories and experienced the intervention differently.

Mrs. Lynn. I observed three student participants (Korey, Ezekiel, Deandre) in Mrs. Lynn's first-period freshman English class. Each of the student participants in Mrs. Lynn's class improved his academic engagement and respectful behavior while using the electronic (MoBeGo) self-monitoring intervention, but pre-existing contextual factors in her classroom may have influenced the outcomes. Similar to findings from previous research that teachers have struggled to deliver evidence-based interventions in classroom settings (Barrett et al., 2013), Mrs. Lynn reported that she did not implement any evidence-based behavioral interventions for the students who participated in this study. Electronic self-monitoring applications were designed to be user-friendly for teachers (Bruhn et al., 2017), and require minimal workload (Briesch et al., 2018) to help teachers who struggle to implement classroom-based behavioral interventions, as was demonstrated in Mrs. Lynn's class. However, it should be noted that due to the lack of an active intervention in the baseline condition, introducing any novel evidence-based intervention was likely to improve behavior over the business as usual condition (Shadish et al., 2002). For example, the descriptive data that I collected indicated that Mrs. Lynn was not providing students with opportunities to respond or praising them for specific behavior as often researchers have recommended, both of which are evidence-based interventions that have been effective for youth with high incidence disabilities (MacSuga-Gage & Simonsen, 2015; Moore et al., 2019; Royer, Lane, Dunlap, & Ennis, 2018).

When Mrs. Lynn was not rushed and had the time to engage the student participants, she would quickly engage in a brief conversation with them to explain why she had given them a particular rating. For example, if she rated Korey a two on academic engagement, she would remind him to put his phone away so he was not distracted and could receive a higher rating at the next opportunity. Directly engaging with the students at 5-minute intervals may have

provided a positive impact beyond having the students self-monitor and reflect on their behavior because Mrs. Lynn was able to stop disruptive behaviors every time the students had to rate themselves. As noted in previous research on self-monitoring, obtaining attention in a consistent manner from a teacher is a strength of implementing self-monitoring for students who display attention seeking behavior (Lower et al., 2016), similar to the participating students (Korey, Ezekiel, Deandre) in Mrs. Lynn's class.

       Korey. At the time of this study, Korey had zero credits but was chronologically in his junior year of high school. As a result, he reported feeling hopeless and did not foresee himself graduating from high school. However, he said that he enjoyed using the self-monitoring intervention because it gave him a short term (i.e., each period) goal that he could meet, which made him feel successful. During our initial discussion and training, Korey made it clear that he did not believe he would be able to remain engaged and well behaved all the time, but later stated that he liked the goal of a 10% improvement because it was realistic and meant that he could still talk to his friends and check his phone occasionally (Bruhn et al., 2016). Research on behavioral goal setting indicates that it may be effective for students with externalizing behavior when delivered as part of a multicomponent intervention, and Korey may have been more responsive to the electronic self-monitoring intervention with a goal than a self-monitoring intervention alone (Bruhn et al., 2016).

       Korey also enjoyed entering his ratings and then checking to see if they aligned with the ratings Mrs. Lynn had entered. It appeared as if trying to match his ratings with the same ratings as Mrs. Lynn was a game to Korey, and he would often make a quick comment after (e.g., "I guessed wrong, I thought that you would rate me a three instead of a two"). It should be noted though, that Korey appeared to get better at hiding his behavior from Mrs. Lynn, especially using

his phone, and would try to use it when Mrs. Lynn was engaged with other students and not looking at him, or he would quickly put it away if she looked in his direction. Lastly, when I compared Korey's results to what was occurring in the class (e.g., direct instruction, group work) while he was displaying each behavior, it appeared as if Korey was most likely to benefit from using the MoBeGo self-monitoring intervention during individual and small group work, as opposed to during direct instruction with the whole class. Even when using the intervention, Korey struggled to maintain focus and respectful behavior during whole class activities, or when there was less structured (i.e., transition) time.

Ezekiel. Among the student participants in Mrs. Lynn's class, Ezekiel was unique because he enjoyed English, was passing the class, completed some work every class period, and seemed invested in completing his education. However, he did still spend extended periods of time speaking to his friends, checking his phone, and had been suspended for disruptive behavior several times throughout the year. For example, he was the last of Mrs. Lynn's students to start the study because he was suspended when this study started. The confirmatory direct observations and baseline observations revealed that Ezekiel would typically spend the beginning portion of each class talking with his friends, and then he would rush to complete as much work as possible when the period was getting close to ending (i.e., the last 10-minutes of class).

During the training sessions, Ezekiel seemed most excited about having a goal to reach (i.e., display academic engagement and respectful behavior 40% of the class period) and was excited to know his goal after finishing the baseline phase. Similar to Korey, Ezekiel may have displayed increased academic engagement and respectful behavior by incorporating a goal into the self-monitoring intervention as opposed to using self-monitoring alone, as has been

previously demonstrated in self-monitoring research (Bruhn et al., 2016; Briesch et al., 2018). Ezekiel closely monitored his goal during both intervention phases and would make comments to his peers about how they needed to stop distracting him so that he could reach his goal. When this occurred, he would typically move to a part of the room that was away from other students so he could work by himself. By doing so, Ezekiel's demonstrated a level of self-awareness, and his actions resulted in improved his outcomes, which is the driving theory behind self-monitoring (Briesch & Chafouleas, 2009). If Ezekiel started his work at the beginning of class, and Mrs. Lynn provided engaging work that lasted the entire class period, he was able to remain engaged and respectful for nearly the entire period of the class. By engaging Ezekiel in his classwork at the beginning of the period, Mrs. Lynn was able to use the principals of behavioral momentum to keep Ezekiel engaged for extended periods of time, which is similar in to outcomes in research with other students with EBD (Knowles, Meng, & Machalicek 2015), though Mrs. Lynn did not knowingly or explicitly incorporate behavioral momentum into this intervention.

When I compared Ezekiel's behavioral data with what was occurring in the class when he displayed those behaviors, there did not appear to be a strong relationship between his behavior and the academic activity. Instead, Ezekiel appeared to do the best when Mrs. Lynn engaged Ezekiel in his work at the very beginning of class, and he was then able to maintain focus for the duration of the class. For example, if Mrs. Lynn reminded Ezekiel of his goal at the beginning of class and he moved himself to a quiet location to work, he typically kept working for the duration of the class. During the withdrawal conditions, Ezekiel struggled to get started on his work, and he returned to rushing to finish his work at the end of class.

Deandre. Deandre was expelled before the completion of this study, and therefore his data are only descriptive in nature, but his experiences provide descriptive information which is

useful to address the complex needs of high school students with high incidence disabilities.

Deandre was 15-years-old during this study, but he often displayed behaviors that were not

typical of his peers (i.e., immaturity) and was more likely than the other participants to display

threatening behavior to his teachers. For example, Deandre would make immature jokes in class

to get attention, and during the confirmatory direct observation, he threatened a special education

teacher who entered the room to ask him a question. He said that Mrs. Lynn was his favorite

teacher and that he behaved better in her class than others, but the confirmatory direct

observations and baseline observations indicated that he walked around class and talked to his

peers regularly. Even though he was walking around and appeared not to be listening, he would

randomly engage in work and typically seemed to know the answers to questions.

Deandre's behaviors were primarily attention seeking, and he seemed to enjoy having

Mrs. Lynn check on him every 5-minutes. Every time Deandre entered his rating, he commented

on reaching his goal, which both helped and hindered his outcomes. For example, when Deandre

received a good rating from Mrs. Lynn, he made positive comments, smiled, and appeared to

enjoy being recognized for doing well. However, if he had a 5-minute stretch where he had not

met his goal, he would comment on how Mrs. Lynn's ratings were going to keep him from

reaching his goal and occasionally would attempt to argue with her. When Mrs. Lynn gave a

rating that did not match his goal, she would not engage in the argument and only made a brief

comment on what he could do to improve his rating in the next 5-minute interval. Previous

reviews of research on self-monitoring have not addressed student arguments from entering or

reviewing ratings, and therefore, I did not include this topic in my training. However, given the

established body of research on coercive interactions between students with aggressive behaviors

and their teachers (Sutherland et al., 2008), future research on self-monitoring may benefit from

addressing this issue during training by instructing the teacher how to respond to the situation

and coaching the student on how to best handle differences in opinions. However, the disruptions

were brief, and when Deandre focused again, he would move to a seat by himself to improve his

outcomes, and then he would be able to complete his work by himself. Similar to Ezekiel,

Deandre's self-management strategies demonstrated the self-awareness goal of self-monitoring

interventions. Becoming aware of his actions through self-monitoring, and then changing his

behavior was the ultimate goal of self-monitoring, and the awareness may have helped Deandre

display increased rates of academic engagement and respectful behavior beyond the

effectiveness of interventions that involve having a teacher collect behavioral data instead of the

student (Briesch & Chafouleas, 2009). My examination of Deandre's outcomes compared to

classroom activities indicated that he typically struggled the most during the first and last several

minutes of class, but his behavior did not appear to be affected by the type of classroom activity.

      As was the case with Mrs. Lynn's two other students in this study (Korey and Ezekiel),

Deandre was not enrolled when I returned to conduct the maintenance phase. Deandre was

expelled for displaying physically inappropriate behavior towards his peers during lunch.

Although each student displayed improvement in Mrs. Lynn's classroom when using the

electronic (MoBeGo) self-monitoring intervention, the inability for each of them to remain

enrolled in school suggests the need for comprehensive school-wide evidence-based

interventions to improve overall outcomes for high school students displaying elevated levels of

externalizing behavior. As previous researchers have identified (e.g., Cairns et al., 1989; Lane et

al., 2008; Vaughn et al., 2011; Wagner & Newman, 2012) youth similar to the participants in this

study are at risk for experiencing among the poorest academic and post-secondary outcomes

(e.g., low employment rate, contact with the criminal justice system), and classroom-based

behavioral management interventions such as the electronic (MoBeGo) self-monitoring intervention are only one piece of the puzzle to improving these outcomes.

Mrs. Wilkinson. I observed the fourth student participant (Noel), in Mrs. Wilkinson's freshman math class, which had 33 students on the roster and typically had more than 30 students in class each day. If any of Mrs. Wilkinson's students from this class were expelled, moved, or otherwise dropped the class, she would immediately receive a new student. The large class size, coupled with the rotating roster, provided numerous challenges to Mrs. Wilkinson's ability to deliver effective behavioral management interventions to her students with high incidence behavioral disabilities. As previously noted, Mrs. Wilkinson's struggle to implement classroom-based behavioral management interventions is consistent with previous research on delivering behavioral interventions in classroom settings (Barrett et al., 2013). The only behavioral management strategy that I observed in Mrs. Wilkinson's class involved her writing students' names on the board when she caught them with a phone to let them know that they had a lunch detention. This punitive behavioral management strategy appeared to be ineffective, which is in line with recent research that indicates positive behavioral interventions are more effective than punitive strategies (e.g., detention, office referrals; Bradshaw, Pas, Debnam, & Johnson, 2015; Houchens et al., 2017).

Mrs. Wilkinson recruited Noel to participate in this study because she thought he displayed escape behavior to avoid classwork, and she mentioned that he was often distracted. The confirmatory and baseline observations revealed that Noel would work for brief periods of time, but then started talking to his friends. The observations also revealed that Noel was very soft-spoken and could speak with students seated around him without Mrs. Wilkinson noticing that he was engaged in a discussion. Since she did not realize that Noel was talking to his

classmates, she focused her attention on other students in the classroom, and Noel did not receive much attention from her. When Mrs. Wilkinson started using the intervention, she checked Noel's academic progress each time he entered his ratings and discovered that Noel typically stopped working if he did not know how to answer a question. Mrs. Wilkson spoke with Noel and instructed him to start seeking assistance (e.g., raising his hand) when he needed help instead of talking to his peers. Teaching hand raising as a replacement behavior to talking with peers appeared to help Noel stay engaged, and the additional academic support allowed him to work for longer periods of time. Providing immediate academic and behavioral feedback is a self-monitoring component that Bruhn and colleagues (2015) identified as one aspect that may improve outcomes for students with behavior problems due to the teacher having more frequent and immediate contact with a struggling student. As a result of using the electronic (MoBeGo) self-monitoring intervention in 5-minute intervals, Mrs. Wilkinson was able to identify Noel's academic needs before disruptive behaviors occurred and therefore, she could help improve his rates of academic engagement and respectful behavior.

Noel. Noel's behavior was slightly less disruptive to classroom activities compared to the other student participants because he was soft-spoken. Mrs. Wilkinson surmised the function of Noel's behavior was to escape work, but the FAST form completed by Mrs. Wilkinson indicated that the primary function of his behavior was attention seeking. My observations and interview with Noel revealed that the most likely function of his behavior was attention from his peers and that he was not concerned about attention from teachers. Although my initial observations revealed that Noel quietly spoke to his peers throughout class and did not appear to be concerned about completing his work, he indicated that he cared about his grades and wanted to do well so that he could continue to play on the basketball team. As previously mentioned, when he began

to use the self-monitoring intervention, he was able to obtain additional one-on-one support from Mrs. Wilkinson and improved his rates of academic engagement and respectful behavior. This appeared to be due to him raising his hand to ask for help instead of talking to his classmates.

Unlike the other student participants in this study, Noel did not seem concerned with his goal and never mentioned it to Mrs. Wilkinson. Additionally, his social validity score and my observations of his behavior during the intervention indicated that he seemed the most ambivalent about the intervention of all the student participants. Noel's increased academic engagement and respectful behavior appeared to be a result of the additional academic attention he received from Mrs. Wilkinson, which in turn increased his respectful behavior. Noel's initial academic struggles and behavior are consistent with the literature on students with high incidence disabilities (Dauber & Hogue, 2011; Lane et al., 2008; Maggin et al., 2016; Wagner & Newman, 2012), and in his case, the one-on-one academic support may have provided a more substantial impact on his behavior than the electronic (MoBeGo) self-monitoring intervention. As a result, over the course of this study, Noel improved his rates of academic engagement and respectful behavior across all classroom activities, including group work, independent work, and whole class instruction.

Intensive behavioral interventions. All of the students in this study exhibited improved academic engagement and respectful behavior without requiring the electronic (MoBeGo) self-monitoring intervention to be intensified; however, the students in this study apparently had a number of complex needs that may have required more intensive classroom-based behavioral interventions. Therefore, a framework was in place to intensify the electronic self-monitoring intervention had any of the students not displayed adequate growth. If I had to intensify the intervention, I would have utilized a data-based initialization (DBI) framework to determine the

intensification process by either incorporating a contingent reinforcement, reducing the self-monitoring interval lengths, or lowering the goal. Using a DBI framework would have allowed me to intensify the intervention to meet the unique needs of each student by aligning the intensification with the function of the student's behaviors (Danielson & Rosenquist, 2014). Furthermore, each student in this study struggled academically and was failing courses, and the DBI framework could have been intensified by using the students behavioral and academic data to link the delivery of evidence-based behavioral and academic interventions in the classroom (Fuchs et al., 2017). For instance, Deandre often got in trouble for leaving his class when he did not understand the content, and as a result, he would receive disciplinary actions for walking the hallways without permission. Had the teachers proactively collected academic and behavioral data to guide the implementation of evidence based academic interventions (e.g., peer assisted learning) and self-monitoring, Deandre may have remained in class and experienced fewer behavioral issues.

Implementation Fidelity

Mrs. Lynn implemented the electronic (MoBeGo) self-monitoring intervention with complete fidelity 85% of the time. She was unable to use the intervention in 5-minute intervals on two occasions, and on another occasion, one of the participants left after class before she could consult with him. Although she had several students using the intervention in the same class period, her implementation fidelity did not appear not affected by the number of students participating. Both of the sessions during which she did not adhere to the 5-minute intervals were due to her providing whole-class direct instruction and being unable to walk over to the students to enter ratings. Mrs. Lynn began each of her classes with whole class instruction for a quick review, and then the students typically transitioned to using technology for small group or

individual work. However, during two of the 20 (10%) class periods that I observed, she provided whole-class direct instruction for an extended period of time (e.g., 30 minutes). As a result, she was unable to interrupt her instruction and had to lengthen the frequency of the self-monitoring to longer than 5-minute intervals. Mrs. Lynn noted that it would have been easier for her to implement the intervention with fidelity had she only used the electronic (MoBeGo) self-monitoring intervention for a shorter duration during class, or when she was engaged in instructional activities that involved her walking around the room as opposed to whole group direct instruction. In the two previous studies using electronic self-monitoring in high school settings, Dooley (2018) implemented the intervention in 15-20 minute segments, and Vogelgesang and colleagues (2016) implemented for the length of the class period, and both had high implementation fidelity, which indicates that teachers can implement electronic self-monitoring for varying durations (i.e., 20 minutes or an entire class period) with fidelity.

Although Mrs. Wilkinson had provided perfect feedback on her social validity measures related to workload and ease of use, she was unable to enter ratings every 5-minutes during 30% of the sessions because she was occupied with other classroom activities. Her class regularly had over 30 students in attendance, which meant that during individual or group work she was often busy providing one-on-one support and could not stop to walk over to the participating student and have him enter his rating. At the conclusion of the study, Mrs. Wilkinson noted that she would like to continue using the intervention with the target student and another student in the same class, but she would use longer intervals. Additionally, Mrs. Wilkinson also stated that the intervention was difficult to implement during certain activities, such as when she was teaching a new math skill to the entire class. She stated that it was easier for her to implement with fidelity

when she was already walking around the class and did not have to interrupt direct instruction to enter ratings.

Social Validity

Previous research on self-monitoring interventions has indicated high social validity according to both teachers and students. The social validity survey results from this study indicated that both teachers regarded the electronic (MoBeGo) self-monitoring intervention as an acceptable invention and that they would be willing to use the intervention in the future. An analysis of Mrs. Lynn's subscales indicated that she had two concerns related to the intervention. She reported that in the future, she would need an iPad to implement the intervention, which her school did not provide. Mrs. Lynn also indicated that the intervention was not consistent with her previous classroom management strategies and that she would require additional training on how to more effectively use the intervention to improve outcomes for other students, which is consistent with previous research indicating that teachers require adequate and ongoing training when incorporating new behavioral interventions in their classroom (Wehby & Kern, 2014). Mrs. Wilkinson provided the highest scores possible on every question in both social validity scales (URP-IR, IRP-15). During the interview and conversations that occurred during the study, Mrs. Wilkinson said that she thinks the intervention was effective and worthwhile because it reminded her to check on Noel every 5-minutes, which gave her a chance to make sure that he was working and to answer any questions he had, which in turn kept him engaged. After the study, she also noted that she wanted to use the intervention with other students who were not part of the study. As with previous research on electronic self-monitoring in high school settings (e.g., Dooley, 2018; Vogelgesang et al., 2015), Mrs. Lynn and Mrs. Wilkinson indicated that they perceived the electronic (MoBeGo) self-monitoring intervention to be socially valid and

effective in high school settings. The social validity results from this study further contribute to the evidence-base for teacher's acceptability to use electronic-self monitoring in high school classrooms.

The students' scores on the social validity measure also indicated that they thought the electronic (MoBeGo) self-monitoring intervention was effective and that they would like to continue to use it in the future. Across all three of the student's reports, the main concern was that the teacher walking over to the student to enter ratings every 5-minutes drew too much attention to them from their peers. This was noted by the students when they indicated that they would like to turn off the audible noise that reminded the teacher that 5-minutes had passed. The students stated that the noise drew further attention to them, which they did not want. Besides the unwanted extra attention, an analysis of their social validity (CURP) subscales did not reveal any other findings for either Korey or Ezekiel, which indicated that they perceived the intervention to be socially valid. Deandre was expelled before the end of the study and did not complete the social validity measure. Noel rated the intervention with the lowest social validity scores of any of the teacher or student participants in this study, and my analysis of his social validity scores indicated that Noel thought the intervention was intrusive because it focused too much attention on him.

Social validity outcomes are important in single-case research designs because they help researchers identify interventions that are effective and acceptable for use in a classroom setting (Ledford & Gast, 2018). The social validity results from this study suggested that the teachers perceived electronic (MoBeGo) self-monitoring interventions socially valid to improve academic and behavioral outcomes for high school students who display elevated levels of externalizing behaviors. The students also rated the intervention as socially valid but provided slightly lower

scores due to the intervention focusing too much peer attention on them. The undesired additional attention may be mitigated by extending the length of intervals (e.g., every 8-minutes instead of every 5-minutes), or by placing the iPad on the student's desk for the duration of a class period instead of having the teacher walk the iPad to the student at the conclusion of each interval. Lastly, the undesired attention may have also been the result having an outside observer (myself and the second observer) in the classroom who looked at the student every 15-seconds and then make a note on a paper in front of the participants' peers, as opposed to having the teacher use the intervention without researchers present. One way to assess this may be to have the students complete a social validity measure after an extended maintenance phase to determine if the absence of a researcher improved their perceptions.

Limitations

Several limitations should be considered when viewing the results of this study. The limitations can be classified as those that affected the external and internal validity of this study. The primary limitation that affected external validity was that neither of the teachers were implementing behavioral management strategies in the baseline conditions. The introduction of a novel intervention without an active control intervention might have resulted in an improvement if any new intervention (e.g., the Good Behavior Game, positive peer reporting) had been introduced (Shaddish et al., 2002). Future research on the effectiveness of electronic self-monitoring can address this issue by utilizing an active intervention in the baseline condition. For example, I could have provided professional development and coaching to the participating teachers on behavioral management interventions (e.g., increasing opportunities to respond and praise) before beginning the study. Improving behavioral management strategies in the baseline condition would have strengthened the results of this study by providing supporting evidence

that implementing a self-monitoring intervention would have been effective for teachers who already used evidence-based behavioral management interventions in their classroom (Ledford & Gast, 2018). Lastly, I did not have access to the student's IEPs, which precluded me from descriptive information about each student, thus negatively affecting generalizability.

There were also several limitations that likely affected the internal validity of this study. First, I collected all of the observation data and was not blind to the intervention. Having researchers collect their own data opens the results to the possibility of bias, although this was limited by having a second observer for a minimum of 25% of the sessions for each participant and in each phase. Similarly, the second limitation is that I collected all of the data on implementation fidelity and did not have the second observer complete the form or verify the results. Third, I collected the data while directly observing the students, which may have resulted in the students experiencing the Hawthorne Effect. The Hawthorne Effect is when participants in a study know that they are being observed, and therefore change their behavior (Shadish et al., 2002). Lastly, the dependent variable of respectful behavior was chosen for this study because it aligned with similar positively stated PBIS outcomes that were previously used in studies conducted in elementary and middle school settings (Bruhn et al., 2018) However, the term respectful behavior was not appropriate for this study because it did not align to a school-wide PBIS goal. A dependent variable of compliant behavior or appropriate behavior may have been more appropriate for a high school setting.

Implications for Research and Practice

Researchers have documented the effectiveness of using traditional paper and pencil self-monitoring interventions in classrooms (Busacca et al., 2015; Maggin et al., 2013), but as electronic self-monitoring applications become more common, there is a need for research on

how electronic self-monitoring applications, such as MoBeGo, can best be utilized to improve student outcomes beyond traditional paper and pencil self-monitoring. For example, several earlier systematic reviews of self-monitoring interventions (e.g., Briesch et al., 2018; Bruhn et al., 2015) focused on which components (e.g., graphing, goal setting, contingent reinforcements) affected student outcomes, but the MoBeGo application automatically includes graphing and goal setting as part of the application. Additionally, the teachers in this study would often remind the students of the goals before class, and occasionally provided examples of expected behaviors or how to improve their ratings from the previous day. Therefore, in this study, the MoBeGo intervention sometimes included components of check-in check-out (CICO). Further research can focus on how combining self-monitoring with goal setting, CICO, and graphing affects student outcomes, and if additional or fewer components should be included in future electronic applications. There is still a dearth of research on evidence-based behavioral interventions for students with EBD, especially high school students, which indicates a need for several areas of additional research. For example, high school students with EBD are likely to have coercive interactions with teachers (Sutherland et al., 2008), which occurred in this study when the student did not agree with the ratings that the teacher provided. Since teacher-student interactions occur in regular intervals (e.g., 5-minute intervals) during self-monitoring interventions, additional research can investigate ways to provide teachers with training to mitigate coercive interactions.

The students in this study demonstrated elevated levels of externalizing behavior outside of the classroom and could have benefited from a systematic school-wide framework to guide the implementation of interventions across all settings (e.g., hallway, lunchroom, bus), such as positive behavioral interventions and supports (PBIS). Students with high incidence disabilities

who display externalizing behavior benefit from consistent behavioral management expectations across settings (Zaheer et al., 2019), and although the PBIS framework has an extensive research base in elementary and middle school settings, additional research is needed on how educators can utilize PBIS in high school settings can collect and analyze student specific data to provide consistent behavioral management interventions throughout the school day. For example, Deandre and Ezekiel were suspended for displaying disrespectful behavior to adults in the hallway and bus, respectfully. Neither of those settings utilized a behavioral management framework, and as a result the two students participants missed school. Therefore, researchers should continue to examine ways to use the PBIS framework to collect and analyze student specific data to implement evidence-based interventions across settings with fidelity. Lastly, there is still a need for additional evidence-based behavioral management interventions that increase with intensity which teachers of high school students with EBD can efficiently implement in their classrooms (Maggin et al., 2016). The students in this research project responded to the self-monitoring intervention without requiring further intensification, but future research can focus on ways to intensify self-monitoring interventions for students with the most severe and persistent needs (Bruhn et al., 2015; Wehby & Kern, 2014).

Teachers report that they feel inadequately prepared to provide behavioral interventions and cite high-frequency, low-intensity behaviors (e.g., speaking out of turn, not following directions, getting out of seat without permission) as among the most significant challenges they face in the classroom (Busacca et al., 2015; Wehby & Kern, 2014). The findings from this study indicated that teachers found the electronic (MoBeGo) self-monitoring intervention was an effective and acceptable classroom-based behavioral intervention for high school students with high incidence disabilities who displayed high-frequency, low-intensity behaviors; however, the

students displayed complex behavioral problems outside of the classroom that this intervention did not address, and resulted in three of the students (Korey, Ezekiel, Deandre) leaving school before the conclusion of the academic year. In the classroom, the electronic-self monitoring intervention appeared to be effective at improving academic engagement and respectful behavior, and teacher feedback indicated that using MoBeGo during classroom activities was not disruptive. However, both of the teachers indicated that the intervention was easiest to use during academic activities that gave the teacher the ability to freely move around the room, as opposed to during instruction. Additionally, the teachers noted that they would prefer the recording intervals to be longer than 5-minutes, which may make the intervention even less disruptive for high school teachers. The students also stated that they enjoyed using the intervention and found it to be effective, but they did not always like the attention that it brought them. Therefore, teachers should try to use the intervention in a format that is not disruptive to the class and should regularly check with the students to make sure that they are not uncomfortable using the intervention. The teachers in this study both mentioned adjusting the classroom environment for easy access to the participating students and increasing the duration of data entry so that the student had to enter data less frequently as possible solutions to this issue. Lastly, the intervention was capable of improving outcomes for a short period of time (i.e., a class period), but educators should work as a team to incorporate the intervention into other parts of the day (e.g., lunch, passing periods) to improve outcomes and reduce behavior infractions.

This study adds to the growing literature base related to the high rate of absenteeism and dropout rate of high school students with aggressive behavior and low academic performance (Wagner & Newman, 2012). The all left school for various reasons, but all of their situations may have been improved with improved and systematically connected behavioral and academic

interventions in their other classrooms. For example, Zaheer and colleagues (2019) identified promising practices for teachers of students with EBD by providing examples of how teachers can create structure and predictability in the classroom, as well as promoting positive classroom environments, as ways that teachers can address the complex behavioral and academic needs of students with EBD. For example, Zaheer and colleagues (2019) identified adjusting the classroom environment to decrease disruption, establishing routines, and providing active supervision as research supported strategies to increase structure and predictability in the classroom. They also identified setting expectations and providing positive praise as research supported strategies to promote positive classroom environments. To guide the delivery of interventions, Zaheer and colleagues (2019) identified the importance of screening students and utilizing data-based decision-making process to identify student needs and intensify interventions.

Lastly, although I did not screen the students to assess their social and emotional needs (SEL), all of the participants in this study appeared to require social and emotional interventions at some point throughout this study. Beyond the histories that each student brought to this study, each of them experienced a traumatic event while this study was occurring. For instance, one student had a friend that was killed, one became a father and was seeking employment, one was arrested, and another faced potential criminal charges. To address these complex and intensive needs, researchers need to develop ways for educators to incorporate SEL interventions into their daily activities. Interventions using SEL principles grew from cognitive behavioral research, similar to self-monitoring, and typically involve teaching students' social skills, self-regulation, empathy, and interpersonal problem solving (Zins, Weissberg, & Walberg, 2004). In a review of SEL interventions delivered across K-12 settings, Durlak and colleagues (2011) found that

students demonstrated significant improvements related to social and emotional skills, behavioral outcomes, and academics. Cook and colleagues (2015) investigated PBIS and SEL as standalone and combined frameworks and found that embedding evidence-based SEL interventions into a schools PBIS framework improved mental health outcomes beyond implementing them separately. However, this study was in an elementary setting, and therefore further research is needed on how educators can implement evidence-based SEL interventions in a high school PBIS framework. The students in this study may have experienced improved outcomes if the school embedded SEL interventions into a PBIS framework, but the students also demonstrated a need for continued social and emotional supports outside the classroom and may have also benefited from a framework that connects school- and community-based social and emotional professionals (Barrett et al., 2013). As noted, all of the students experienced a traumatic event during this study, and each could have benefited from a comprehensive framework that allowed them to receive interconnected evidence-based social, emotional, and behavioral interventions inside and outside of school. For example, the school-based social worker could work with a community-based social worker to provide a continuum of evidence-based interventions across settings.

Conclusion

This study supports the use of an electronic (MoBeGo) self-monitoring intervention to improve academic engagement and respectful behavior for high school students with an IEP for a high incidence disability who also display elevated levels of externalizing behavior. Two general education teachers implemented the electronic (MoBeGo) self-monitoring intervention to monitor both outcomes in 5-minute intervals and were able to deliver the intervention with a high level of fidelity. Both the teachers and students who participated in this study indicated the

MoBeGo intervention was acceptable and that they would like to continue to use it in the future. However, numerous contextual factors may have affected the outcomes and several limitations that should be noted when analyzing the results of this study. Lastly, despite the improved academic engagement and respectful behavior that the students demonstrated during this study, the student demonstrated a need for additional social, emotional, and behavioral interventions beyond the classroom. Researchers and educators need to continue to research ways in which teachers can use a DBI process within a PBIS framework to systematically deliver evidence-based interventions throughout the school day. Further research is needed to investigate how to continue to develop and implement electronic self-monitoring in high school settings as part of a connected framework that provides supports beyond the classroom.

APPENDICES

APPENDIX A

IRB Approval Notice

Approval Notice
Initial Review (Response To Modifications)

February 1, 2019

Skip Kumm, M.Ed.
Special Education
Phone: ▮▮▮▮▮▮▮ / Fax: (312) 996-5651

RE: **Protocol # 2018-1589**
"self-monitoring for high school students with disabilities and externalizing behavior"

Dear Mr. Kumm:

Your Initial Review (Response To Modifications) was reviewed and approved by the Expedited review process on January 26, 2019. You may now begin your research

Please note the following information about your approved research protocol:

> **Please remember to submit letters of support from the schools and/or school districts or sites outside of UIC, which must be on letterhead and signed by an authorized executive at the district or school. No subject recruitment or enrollment may take place until the letters of support are submitted and approved via an Amendment to the UIC IRB.**

> **Please remember to submit all additional active research personnel on Appendix P, via an Amendment, to the UIC IRB. All investigators and key research personnel involved in human subjects research must complete a minimum of two hours of investigator training in human subjects protection every three years.**

> **Please note that minor administrative revisions were made to the recruitment and consent document footers by OPRS staff. Please remember to use only those approved (stamped) documents to recruit and enroll subjects into this research project.**

> **Please note that as per the revised Federal Regulations (2018 Common Rule) and OPRS policies your research no longer requires a Continuing Review; therefore, the approved documents are stamped only with an approval date. Although your research no longer requires a Continuing Review, you will receive annual reminder notices regarding your investigator responsibilities (i.e., submission of amendments, final reports, and prompt reports), and will be asked to complete an Institutional Status Report which will be sent to you via email every 3 years. If you fail to submit an Institutional Status Report, your research study will be administratively closed by the IRB. For more information regarding Continuing Review and Administrative Closure of Research visit: http://research.uic.edu/node/735.**

Protocol Approval: 01/26/2019

APPENDIX A (continued)

Approved Subject Enrollment #:   15
Additional Determinations for Research Involving Minors: The Board determined that this research satisfies 45CFR46.404, research not involving greater than minimal risk. Therefore, in accordance with 45CFR46.408, the IRB determined that only one parent's/legal guardian's permission/signature is needed. Wards of the State may not be enrolled unless the IRB grants specific approval and assures inclusion of additional protections in the research required under 45CFR46.409. If you wish to enroll Wards of the State contact OPRS and refer to the tip sheet.
Performance Sites: UIC
Sponsor: None
Research Protocol(s):

   a) Self-monitoring for high school students with disabilities and externalizing behavior;01/28/2019

Recruitment Material(s):

   a) Teacher Initial Contact Email; Version 3; 01/29/2019
   b) Teacher 2nd Contact Email; Version 3; 01/29/2019
   c) Teacher 3rd Contact Email; Version 3; 01/29/2019
   d) Email response Script; Version 2; 01/29/2019
   e) Information Sheet; Version 2; 01/29/2019
   f) Phone response Script; Version 2; 01/29/2019
   g) Research involves activities related to screening, recruitment, or determining eligibility per 45 CFR 46.116(g).

Informed Consent(s):

   a) Self-Monitoring (Teacher Consent); Version 3; 01/29/2019

Assent(s):

   b)   Assent; Version 3; 01/29/2019

Parental Permission(s):

   a) Self-Monitoring (Parental Permission); Version 3; 01/29/2019

Your research meets the criteria for expedited review as defined in 45 CFR 46.110(b)(1) under the following specific category(ies):

(7) Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
12/14/2018	Initial Review	Expedited	12/16/2018	Modifications Required
01/09/2019	Response To Modifications	Expedited	01/26/2019	Approved

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APPENDIX A (continued)

Please remember to:

→ Use your **research protocol number** (2018-1589) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements on the guidance,
   "**UIC Investigator Responsibilities, Protection of Human Research Subjects**"
       (http://research.uic.edu/irb/investigators-research-staff/investigator-responsibilities).

Please note that the UIC IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Please be aware that if the scope of work in the grant/project changes, the protocol must be amended and approved by the UIC IRB before the initiation of the change.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact OPRS at (312) 996-1711 or me at (312) 996-9299. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

                          Sincerely,

                          Allison A. Brown, PhD
                          IRB Coordinator, IRB # 2
                          Office for the Protection of Research Subjects

Enclosure(s): Approved and stamped documents are available via OPRSLive.

1. **UIC Investigator Responsibilities, Protection of Human Research Subjects**
2. **Informed Consent Document(s):**
   a) Self-Monitoring (Teacher Consent); Version 3; 01/29/2019
3. **Assent Document(s):**
   a) Assent; Version 3; 01/29/2019
4. **Parental Permission(s):**
   a) Self-Monitoring (Parental Permission); Version 3; 01/29/2019
5. **Recruiting Material(s):**
   a) Teacher Initial Contact Email; Version 3; 01/29/2019
   b) Teacher 2nd Contact Email; Version 3; 01/29/2019
   c) Teacher 3rd Contact Email; Version 3; 01/29/2019
   d) Email response Script; Version 2; 01/29/2019
   e) Information Sheet; Version 2; 01/29/2019

APPENDIX A (continued)

    f) Phone response Script; Version 2; 01/29/2019
    g) Research involves activities related to screening, recruitment, or determining eligibility per 45 CFR 46.116(g).

cc: Norma Lopez-Reyna, Special Education, M/C 147
       Elizabeth Talbott (Faculty Sponsor), Special Education, M/C 147

APPENDIX B

Teacher Consent

The linked image cannot be displayed. The file may have been moved, renamed, or deleted. Verify that the link points to the correct file and location.

APPENDIX B (continued)

Important Information
This information gives you an overview of the research. More information about these topics may be found in the pages that follow.

WHY IS THIS STUDY BEING DONE?	The purpose of this research is to learn if self-monitoring is an effective intervention for high school students with high incidence disabilities who display elevated levels of externalizing behavior. This research will also determine if additional components can be added to improve academic engagement and respectful behavior for students who do not initially respond to the intervention.
WHAT WILL I BE ASKED TO DO DURING THE STUDY?	This research study will involve you and one or more of your students using an iPad application to track each student's academic engagement and respectful behavior and may last for the remainder for the semester. The study will take place in your classroom during a class period that you choose. Each component of the research is described in detail below and your total time commitment outside of classroom should be less than three hours. All observations of the participating students will be scheduled at your convenience. **Your tasks** 1. You will identify a student or students who have a high incidence disability (e.g., emotional or behavioral disorder, ADHD, conduct disorder) and elevated levels of externalizing behavior. 2. You will complete a *Strength and Difficulties Questionnaire* to confirm that the student displays elevated levels of externalizing behavior (less than 5 minutes). 3. You will provide the student and parent with information about the study (provided by me) with my contact information. I will work with the parent and student to gain their consent and assent to participate in the study (10 minutes). 4. I will observe your class to confirm that the student displays elevated levels of externalizing behavior. 5. You will be trained to use the intervention and iPad self-monitoring software application. 6. You will complete a *Functional Assessment Screening Tool* to determine the function of the behavior for the student you nominated (less than 10 minutes). 7. There will be two training sessions. You will be trained on self-monitoring and how to use the iPad application (no more than three hours).

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Self-Monitoring
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APPENDIX B (continued)

	8. You will be interviewed by me so that I can learn more about what occurs in your class, and what interventions you have previously used, along with demographic questions (15 minutes). Please note, this will not be audio recorded.
	9. During the class period that you designate, you and the student whom you nominated will record his or her academic engagement and respectful behavior at regular intervals (e.g., every 5-minutes). You will also meet briefly (less than 3 minutes) with the student at the end of each class. The time commitment for you to record the behavior data will be less than 5 minutes total.
	▪ If needed, you and I may add additional components, such as a reinforcer or more frequent data collection (e.g., every 3 minutes instead of every 5 minutes) to help the student reach his or her goal.
	10. The student and you will briefly stop using the self-monitoring intervention.
	11. The student and you will use the self-monitoring intervention again.
	12. I will ask you to complete two forms about your perception of self-monitoring.
	13. If time permits, I will return two weeks later to observe whether the intervention is continuing to show improvements
	Classroom Observations
	☐ I am going to observe a student while you are teaching regularly scheduled lessons in your classroom.
	☐ Observations will be the entire length of the class.
	☐ During the observation, I will sit on the side to reduce any distractions for other students. I will talk with you or anyone else during this time.
	☐ I will keep track of a student's academic engagement or respectful behavior. You do not need to plan anything special for observations aside from your typical instruction.
	☐ Roughly 30% of the observations will have a second observer. The purpose of the second observer is to ensure we are collecting accurate information.
	☐ You will also keep track of the student's engagement and behavior on the iPad.
HOW MUCH TIME WILL I SPEND ON THE STUDY?	1. You will complete a Strength and Difficulties Questionnaire (5 minutes per student).
	2. You will be trained on self-monitoring and how to use the

APPENDIX B (continued)

	iPad application (no more than three hours). 3. You will complete a *Functional Assessment Screening Tool* (less than 10 minutes). 4. You will be interviewed by me so that I can learn more about what occurs in your class, and what interventions you have previously used, along with demographic questions (15 minutes). Please note, this will not be audio recorded. 5. You will use the iPad application during class at regular intervals and meet with the student after to discuss the recorded behavior (2-3 minutes each day). 6. You will complete two forms about your perception of self-monitoring (30 minutes).
ARE THERE ANY BENEFITS TO TAKING PART IN THE STUDY?	Being in this research study may help you learn how to use self-monitoring to improve your students' academic engagement and respectful behavior. We hope that your participation in the study may benefit other people in the future by helping us learn more about using self-monitoring in high schools.
WHAT ARE THE MAIN RISKS OF THE STUDY?	The primary risks presented by this research study are breaches of privacy (others outside of the study may find out you are a subject). You may feel uncomfortable answering the interview questions and have the right to refuse to answer any or all of them. For details and a list of risks you should know about, please see the "What Are the Potential Risks and Discomforts of the Study" section below.
DO I HAVE OTHER OPTIONS BESIDES TAKING PART IN THE STUDY?	You have the option to decide not to take part at all or you can withdrawal your participation at any time without any consequences. If you refuse to participate in this study or withdrawal, it will not affect your relationship with your school or with UIC.
QUESTIONS ABOUT THE STUDY?	If you have any questions or concerns about this study or your part in it or if you have any questions, concerns, or complaints about the research, contact the me, Skip Kumm, at skumm2@uic.edu, (###) ###-#### or my advisor, Elizabeth Talbott, at etalbott@uic.edu, (###) ###-###. If you have questions about your rights as a study subject; including questions, concerns, complaints, or if you feel you have not been treated according to the description in this form; or to offer input you may call the UIC Office for the Protection of Research Subjects

APPENDIX B (continued)

	(OPRS) at 312-996-1711 or 1-866-789-6215 (toll-free) or e-mail OPRS at uicirb@uic.edu.

Please review the rest of this document for details about these topics and additional things you should know before making a decision about whether to participate in this research. Please also feel free to ask the researchers questions at any time.

During this study, Skip Kumm and his research team will collect information about you for the purposes of this research. During this study you will be assigned a number to use instead of your name and your name will only be listed on a password protected and encrypted file on a UIC data storage system, and the file will be destroyed at the conclusion of data collection. During this study I will collect data using the following forms.

1.   A Strength and Difficulties Questionnaire to confirm the displays disruptive behaviors in class.
2.   I will collect data using a Functional Assessment Screening Tool, to try and assess the purpose of the students behavior.
3.   I will interview you (described above). This will not be audio recorded.
4.   I will observe the student and collect data on academic engagement and respectful behavior.
5.   At the conclusion of the study I will ask you to complete a form to determine what they thought about the iPad application.

What will happen with my information used in this study?

Any identifiable information will be destroyed after completion of data collection. If I publish or discuss the results of the research in conferences, no information will be included that would reveal your child's name. All personal identifying information, such as your child's name, will be removed from all forms.

What are the potential risks and discomforts of the study?

☐   You may feel uncomfortable answering interview questions and has the right to refuse to answer any or all of the questions.

☐   You may not feel comfortable having an observer in your class.

☐   There is a risk of loss of privacy if other students or teachers find out why your child is participating in the study.

What about privacy and confidentiality?

Efforts will be made to keep your personal information confidential; however, we cannot guarantee absolute confidentiality. In general, information about you, or provided by you, during the research study, will not be disclosed to others without your written permission. However, laws and state university rules might require us to tell certain people about you. For example, study information which identifies you and the consent form signed by you may be looked at and/or copied for quality assurance and data analysis by:

APPENDIX B (continued)

☐ Representatives of the university committee and office that reviews and approves research studies, the Institutional Review Board (IRB) and Office for the Protection of Research Subjects.

☐ Other representatives of the State and University responsible for ethical, regulatory, or financial oversight of research.

☐ Government Regulatory Agencies, such as the Office for Human Research Protections (OHRP).

A possible risk of the study is that your participation in the study or information about you might become known to individuals outside the study. Your interview responses and ratings will be deidentified and stored on a password protected and encrypted UIC data storage system to prevent access by unauthorized personnel.

What are the costs for participating in this research?
There are no costs to you for participating in this research.

Will I be reimbursed for any of my expenses or paid for my participation in this research?
You will receive $250 for each student who you have participate and finish this study. If you do not finish the study, you will be compensated for the visits that I have been completed. For instance, if a you or a student only participate in 6 of the 12 required sessions, you would be compensated $125. If you complete the study, you will receive a total of $250 per student who you have participate in this study and finish. You will receive your payment within approximately 30 days of the conclusion of this study by direct deposit

Can I withdraw or be removed from the study?
If you decide to participate, you have the right to withdraw your consent and leave the study at any time without penalty. If you chose to withdraw, please notify Skip Kumm at skumm2@uic.edu or ###-###-####.

Remember:
Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

Signature of Subject
I have read the above information. I have been given an opportunity to ask questions and my questions have been answered to my satisfaction. I agree to participate in this research. I will be given a copy of this signed and dated form.

_____   _____
Signature   Date

_____
Printed Name

APPENDIX B (continued)

[Required]

_____   _____
Signature of Person Obtaining Consent   Date (must be same as subject's)

_____
Printed Name of Person Obtaining Consent

I have read the above information. I have been given an opportunity to contact the researchers and ask questions, and my questions have been answered to my satisfaction. I agree to participate in this research. **PLEASE PRINT OUT A COPY OF THIS DOCUMENT FOR YOUR RECORDS.**

APPENDIX C

Parent Consent

APPROVED

DATE: 01/26/2019

UIC UNIVERSITY OF ILLINOIS AT CHICAGO
INSTITUTIONAL REVIEW BOARD

University of Illinois at Chicago

Research Information and Consent [Parental Permission] for Participation in Social, Behavioral, or Educational Research

Self-Monitoring for High School Students

Principal Investigator/Researcher Name and Title: Skip Kumm – Doctoral Candidate
Faculty Advisor Name and Title: Elizabeth Talbott - Professor
Department and Institution: Special Education – College of Education
Address and Contact Information: 1040 W. Harrison St. (MC 147), Chicago, Il 60607

About this research study
You are being asked to participate in a research study. Research studies answer important questions that might help change or improve the way we do things in the future.

Taking part in this study is voluntary
Your participation in this research study is voluntary. You may choose to say "no" to this research or may choose to stop participating in the research at any time. Deciding not to participate, or deciding to stop participating later, will not result in the loss of any services, class standing, and/or professional status to which you are entitled, and will not affect your relationship with the University of Illinois at Chicago (UIC) and/or University of Illinois Hospital and Health Sciences System (UI Health), or any of the agencies or organizations collaborating in this research.

This consent form will give you information about the research study to help you decide whether you want to participate. Please read this form and ask any questions you have before agreeing to be in the study.

You are being asked to provide consent for this research study because you are a parent/caregiver of a youth that is a high school student with a high incidence disability (e.g., behavior disorder, learning disorder, ADHD) who displays disruptive behaviors.

A maximum of 5 other student subjects and up to 5 teacher subjects will be enrolled in this research study.

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APPENDIX C (continued)

Note: This research includes subjects who are minors and are not able to consent for themselves. If you are a parent, guardian, or legal representative, the terms "you" or "your" refer to the research subject for whom you are responsible.

Important Information
This information gives you an overview of the research. More information about these topics may be found in the pages that follow.

WHY IS THIS STUDY BEING DONE?	In this research project, I hope to learn more about how high school students with high incidence disabilities (e.g., learning disability, emotional or behavioral disorder, ADHD) can monitor their own behavior to improve academic and behavioral outcomes, and I want to observe your child's respectful behavior and academic engagement during class while he or she is using an iPad application.
WHAT WILL I BE ASKED TO DO DURING THE STUDY?	Before the observation sessions begin, your child will be individually and privately interviewed, by me, Skip Kumm. I will ask questions related to your child's age, gender, ethnicity, and school history, including if your child has ever had an IEP, and academic and behavioral history in school. Your child has the right to refuse to answer any or all of the questions. Your child will then be trained on self-monitoring and how to use the iPad application. Your child and the participating teacher will then use an iPad in one class each day to keep track of academic engagement and respectful behavior at regular intervals (e.g., every 5 minutes) and then discuss their that behavior with the teacher at the end of each class. During this time, I will also observe your child and collect data on the academic engagement and respectful behavior each day that they are using the iPad. If your child's academic engagement and respectful behavior does not improve, I will add additional components, such as providing a reward for reaching a goal, or increasing the frequency of self-monitoring (e.g., every 3 minutes instead of every 5 minutes). I will then briefly stop using the intervention to monitor what occurs, and then I will use the iPad again to track behaviors. Using this type of research design allows me to first collect information about what is happening in the class, then use the iPad to see if behaviors improve, then briefly stop using the iPad to see what happens to the behavior, before using the iPad again one more time to see if the behavior improves again. I will also observe your child every day during one of his or her classes while he or she uses the self-monitoring application on the iPad. The observation sessions will last the duration of the class.

APPENDIX C (continued)

	Your child's teacher will teach the class as regularly planned while I observe your child, along with one of my colleagues. During my observation sessions, your child will ☐ Participate in class in the same fashion as if the research was not being conducted. ☐ Use an iPad to keep track of his or her academic engagement and respectful behavior at regular intervals (e.g., every 5 minutes). ☐ If your child's academic engagement and respectful behavior do not improve, we may add additional components, such as providing your child with a small reward for reaching a goal, or having your child collect his or her data more frequently (e.g., every 3 minutes instead of every five minutes).
HOW MUCH TIME WILL I SPEND ON THE STUDY?	The demographic and academic questionnaire will take approximately 30 minutes. There will be two training sessions that will last approximately three hours total. You child will use the iPad application during your child's regularly scheduled class time and will meet with the teacher for 2-3 minutes after each class to discuss what behaviors they recorded. Your child will use the iPad for a minimum of 12 days, but maybe longer, and if time permits, Skip will return two weeks later to observe for three additional days. At the conclusion of the study I will ask your child to complete two forms about how they perceived the intervention, which should take roughly 30 minutes to complete.
ARE THERE ANY BENEFITS TO TAKING PART IN THE STUDY?	By participating in this study, your child and his or her teacher may learn how to use self-monitoring to increase academic engagement and respectful behavior. Additionally, we hope that your participation in the study may benefit other people in the future by helping us learn more about using self-monitoring with high school students.
WHAT ARE THE MAIN RISKS OF THE STUDY?	The primary risks presented by this research study are breaches of privacy (others in class may find out your child is a subject). Your child may feel uncomfortable being observed during class. If so, he or she may withdraw from this study at any time.

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[Self-Monitoring] [Version 3, 1/29/2019]

APPENDIX C (continued)

	Your child may be uncomfortable with some of the questions that are asked in the interview. Your child can skip and/or not respond to any questions that may make you uncomfortable.
DO I HAVE OTHER OPTIONS BESIDES TAKING PART IN THE STUDY?	This research study is not designed to provide treatment or therapy, and you and your child have the option to decide not to take part at all or you can withdrawal your participation at any time without any consequences.
QUESTIONS ABOUT THE STUDY?	If you have any questions about this study or your part in it or if you have any questions, concerns, or complaints about the research, contact the me, Skip Kumm, at skumm2@uic.edu, (###) ###-#### or my advisor, Elizabeth Talbott, at etalbott@uic.edu, (###)###-#### If you have questions about your rights as a study subject; including questions, concerns, complaints, or if you feel you have not been treated according to the description in this form; or to offer input you may call the UIC Office for the Protection of Research Subjects (OPRS) at 312-996-1711 or 1-866-789-6215 (toll-free) or e-mail OPRS at uicirb@uic.edu.

Please review the rest of this document for details about these topics and additional things you should know before making a decision about whether to participate in this research. Please also feel free to ask the researchers questions at any time.

What procedures are involved?
This research will be performed at your child's school.
☐ This research will be performed at your child's school during a general education (math, English, social studies, science) classes. The research will take place during regularly scheduled class sessions.

During this study, Skip and his research team will collect information about your child for the purposes of this research. Your child will be assigned a number to be used in place of his or her name, and your child's name will only be listed on a password protected and encrypted file on a UIC data storage system, and the file will be deleted at the conclusion of this study. During this study I will collect data using the following forms.
  1) A Strength and Difficulties Questionnaire to confirm your child displays disruptive behaviors in class.
  2) I will collect data using a Functional Assessment Screening Tool, to try and assess the purpose of the behavior.
  3) I will interview your child (described above).
  4) I will observe your child and collect data on academic engagement and respectful behavior.
  5) At the conclusion of the study I will ask your child to complete a form to determine

APPENDIX C (continued)

what they thought about the iPad application.

What will happen with my information used in this study?

I will take all of the information with your child's name on it, including this signed consent form, and lock it in a file cabinet at UIC. Additionally, all of the information collected during this study will be stored on a password protected and encrypted computer system maintained by the University of Illinois at Chicago.

Any identifiable information will be deleted at the conclusion of data collection. If I publish or discuss the results of the research in conferences, no information will be included that would reveal your child's name. All personal identifying information, such as your child's name, will be removed from all forms.

What are the potential risks and discomforts of the study?

- ☐ Your child may feel uncomfortable answering interview questions and has the right to refuse to answer any or all of the questions.
- ☐ Your child may not feel comfortable being observed during class.
- ☐ Other students and teachers will not be told why your child is participating in the study, but they will see your child using an iPad and may know that they are in a research study. Additionally, there is a risk of loss of privacy if other students or teachers find out why your child is participating in the study.

What about privacy and confidentiality?

Efforts will be made to keep your personal information confidential; however, we cannot guarantee absolute confidentiality. In general, information about you, or provided by you, during the research study, will not be disclosed to others without your written permission. However, laws and state university rules might require us to tell certain people about you. For example, study information which identifies you and the consent form signed by you may be looked at and/or copied for quality assurance and data analysis by:

- ☐ Representatives of the university committee and office that reviews and approves research studies, the Institutional Review Board (IRB) and Office for the Protection of Research Subjects.
- ☐ Other representatives of the State and University responsible for ethical, regulatory, or financial oversight of research.
- ☐ Government Regulatory Agencies, such as the Office for Human Research Protections (OHRP).

A possible risk of the study is that your participation in the study or information about you might become known to individuals outside the study. Your observation data, screening forms, or interview questions will be deidentified and stored on a password protected and encrypted UIC data storage system to prevent access by unauthorized personnel.

APPENDIX C (continued)

Your individual data will be stripped of all direct and indirect identifies and the list linking the name to your child's code will be destroyed after data collection.

When the results of the study are published or discussed in conferences, no one will know that you were in the study.

What are the costs for participating in this research?
There are no costs to you for participating in this research.

Will I be reimbursed for any of my expenses or paid for my participation in this research?
Your child will receive $10 cash for each completed study visit. If you do not finish the study, you will be compensated for the visits your child has completed. If you complete the study, your child will receive a minimum total of $ $150; however, your child may receive additional funds if they require additional supports while using the iPad application. Your child will receive his or her payment each Friday for the number of days that your child was observed using the iPad application that week

Can I withdraw or be removed from the study?
If you decide to participate, you have the right to withdraw your consent and leave the study at any time without penalty.

☐ *To withdraw* - Your child can inform the teacher or Skip Kumm to withdraw from the study at any time without it affecting your child's relationship with the teacher or school.

Parents/Guardians, please be aware that under the Protection of Pupil Rights Ace, 20 USC 1232(c)(1)(A), you have the right to review a copy of the questions asked of or materials that will be used with your child. If you would like to do so, you should contact Skip Kumm at skumm2@uic.edu or ###-###-#### to obtain a copy of the questions or materials.

Remember:
Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

Signature of Parent/Guardian/Legal Representative

I have read the above information. I have been given an opportunity to ask questions and my questions have been answered to my satisfaction. I agree to participate in this research. I will be given a copy of this signed and dated form.

_____   _____
Signature   Date

_____

| UIC IRB Social, Behavioral, and Educational Research Informed Consent Template: 11/30/2018 Do NOT Change This Field – IRB Use ONLY | Page 6 of 7 | [Self-Monitoring] [Version 3, 1/29/2019] |

APPENDIX C (continued)

Printed Name

_____
Printed Name of Minor

_____   _____
Signature of Parent, Guardian, Legal Representative   Date of Signature

_____
Printed Name of Parent, Guardian, Legal Representative

_____   _____
Signature of Person Obtaining Consent   Date (must be same as subject's)

_____
Printed Name of Person Obtaining Consent

UIC IRB Social, Behavioral, and Educational
Research Informed Consent Template:
11/30/2018
Do NOT Change This Field – IRB Use ONLY

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[Self-Monitoring]
[Version 3, 1/29/2019]

APPENDIX D

Student Assent

APPROVED

DATE: 01/26/2019

UIC **UNIVERSITY OF ILLINOIS AT CHICAGO**
INSTITUTIONAL REVIEW BOARD

University of Illinois at Chicago
ASSENT TO PARTICIPATE IN RESEARCH

Self-monitoring for high school students

My name is Skip Kumm, and I am a doctoral student in special education at the University of Illinois at Chicago. I am conducting a study that will occur in the spring or summer of 2019, and I will need the help of several students. Participating in this study is voluntary; if you choose to participate, you can withdraw at any time. During this study, you will use an iPad application to keep track of your academic engagement and respectful behavior while participating in class, and I will also observe your engagement and respectful behavior during class. I am asking you to take part in a research study because I am trying to learn more about student self-monitoring to increase engagement and respectful behavior during class for high school students. Once again, participation in this research project is voluntary, you have the right to not participate or withdraw at any time. Please note that there will be three parts to this study, which could last anywhere from 12 school days or until the rest of the semester, depending on how the self-monitoring intervention works and your attendance.

Part 1: Recruitment
- ☐ Your parent/guardian will sign a consent form, giving you permission to participate in the study.
- ☐ You will sign this assent form to provide your permission to participate in this study.
- ☐ This part will take about 20 minutes to complete.
- ☐ Please let me, Skip Kumm, know if you have any questions about this part.

Part 2: Interview
- ☐ I am going to ask you questions about yourself. For instance, I will ask your age, gender, and IEP status.
- ☐ I am going to ask you about previous behavior and academic interventions that you have used.
- ☐ I will interview you in a private setting. You have the right to refuse the interview portion entirely, or to refuse to answer certain questions.
- ☐ The interview will not be recorded and will last roughly 30 minutes.
- ☐ Please let me, Skip Kumm, if you have any questions about this part.

Part 3: Observation
- ☐ You will have two training sessions on self-monitoring and using the iPad application (no more than three hours total)

APPENDIX D (continued)

- You will use an iPad application to track your academic engagement and respectful behavior at regular intervals (e.g., every 5 minutes). At the end of each class you will briefly (less than 3 minutes) meet with your teacher to discuss the results that you recorded.
  - If your academic engagement and respectful behavior to not improve, we may add additional components, such as a reward for reaching your goal, or reducing the frequency (e.g., every 3 minutes instead of every 5 minutes) that you monitor your behavior.
- I am going to observe you during the class period that you are using the iPad applicatoin. I will monitor how often you are engaged in class work and your respectful behavior.
- I will not be talking with you or anyone else when I am observing.
- Occasionally I will have another observer with me. The second observer is helping make sure I am making accurate observations.
- At the end of the study I will ask you to fill out two forms about how you felt about using the self-monitoring intervention (30 minutes)
- If time permits, I will return to see if the self-monitoring is still helping you improve your academic engagement and respectful behavior.
- Please let me, Skip Kumm, if you have any questions about this part.

Feeling Tired or Do Not Want to Participate
- During the times we meet you may get tired or feel like you don't want to participate, which is fine. Participating in this study does not mean you have to attend every class.

Potential Risks of Participation in this Research
- If you chose to participate, I will keep all of your information private and not tell other students you are participating. However, there is always a risk that others will see your information or know you are taking part in this research project.
- Your classmates will see you using the iPad and will know that you are participating in the study.
- Additionally, your teacher will know that you are participating in this study.

Compensation for Participation
- You will be compensated $10 each day that you use the self-monitoring intervention and I observe you. On Friday of each week I will pay you for each day that you participate in the study, which means that you could earn up to $50 per week. If you participate in this study until the end, it will last a minimum of 12 days, which would result in $120 compensation.

Questions/Concerns
- Do you understand the parts of the study described to you?
- Do you have any questions about what you will be asked to do?
- Do you have any questions about what you should do if you feel tired or you feel like you don't want to participate on a given day?
- Do you understand that declining or withdrawing from this research will not affect your status with your teacher or school?

APPENDIX D (continued)

☐ If you have any questions/concerns, or do not understand any of the above questions, please let me know before you proceed.

Your parent/guardian must give permission for you to take part in this study. But even though your parent/guardian said "yes," you can still decide not to participate.

Your rights
- ☐ Remember that even though your parent/guardian agreed that you could participate, you can still tell me "no" and no one will be upset with you.
- ☐ Remember even if you say "yes" now, you can tell me "no" at a later date.
- ☐ **If you don't want to be in this study, you don't have to participate. Remember, being in this study is up to you, and no one will be upset if you don't want to participate or if you change your mind later and want to stop.**

You can ask me any questions that you have about the study at any time. If you have a question, you can call me at (###) ###-####, email me at skumm2@uic.edu, or ask the next time we meet. You may also contact my advisor, Dr. Elizabeth Talbott, at etalbott@uic.edu, (312) ###-#### or the Office for the Protection of Research Subjects (OPRS) at (312) 996-1711.

Please ask any questions that you have before signing this form.

Signing your name at the bottom means that you agree to be in this study. You and your parent/guardian will be given a copy of this form after you have signed it.

_____   _____
Name of Subject   Date

_____
Signature

_____   _____
Signature of Person Obtaining Consent   Date (must be same as subject's)

_____
Printed Name of Person Obtaining Consent

APPENDIX E

Teacher Interview

Teacher Participant number: _____

Directions: Please circle the most appropriate answer or write in your response.

Questions

1) What is your gender?

   a. Male

   b. Female

   c. Other

   d. Would rather not answer

2) How do you identify yourself?

   a. White

   b. Black

   c. Latino

   d. Asian

   e. Other

3) How many years have you been a teacher?

4) What teaching licenses do you possess?

5) What grades have you taught?

6) How many years have you been a special education teacher or taught students with externalizing behaviors?

7) What academic interventions have you previously used?

APPENDIX E (continued)

8) What behavior interventions have you previously used?

9) How many students are currently enrolled in the class that I will be observing?

10) Which classroom management practices and interventions are you currently using with the student who I will be observing?

APPENDIX F

Student Interview

Student Participant number: _____

Directions: Please circle the appropriate answer or write in your response.

Questions

1) What is your current age?

2) What is your current grade?

3) What is your gender?

     a. Male

     b. Female

     c. Other

     d. Would rather not answer

4) How do you identify yourself?

     a. White

     b. Black

     c. Latino

     d. Asian

     e. Other

5) What is your IEP status?

6) If you have an IEP, what is your disability?

7) How many years have you had an IEP?

8) What are the goals on your IEP?

9) What academic interventions have you previously used?

APPENDIX F (continued)

10) What behavior interventions have you previously used?

11) What is your current GPA?

12) If you have taken the SAT or ACT, what was your score?

APPENDIX G

Direct Observation Tool

Participant #: _____   Date: _____

Observer: _____   Class:_____

IOA Observer:_____

Minute	:15		:30		:45		:00	
0	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
1	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
2	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
3	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
4	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
5	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
6	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
7	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
8	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
9	☐	RB	☐	RB	☐	RB	☐	RB
	☐	AE	☐	AE	☐	AE	☐	AE
10	☐	RB	☐	RB	☐	RB	☐	RB

APPENDIX G (continued)

Fidelity – Enter fidelity checklist results	**Contextual Information**
	Comments (include absence info):

Other Data			
OTR	**Praise**	**% of Work Completed**	**IOA Agreement (and teacher student agreement)**

Academic Engagement Definition: Academic engagement is defined as any time the student is working on the assigned task, actively attending to the teacher, or is appropriately engaged in a teacher-directed conversation.

Academic Engagement Examples: . Examples of academic engagement include independently working on the assigned task, independently reading the assigned material, participating in an academic discussion, task-appropriate talking, actively participating in group work, or hand-raising

Academic Engagement Non-Examples: Behaviors that do not meet the definition for academic engagement will include a student not working on the assigned task, a student not engaging in teacher-directed conversations, and students working on materials that are not for the current class.

APPENDIX H

First Teacher Training

11/12/18

Self-Monitoring

Teacher Training Session 1

What is Self-Monitoring?

- Self-monitoring is when a student is responsible for keeping track of their behaviors.
  - Self-monitoring can incorporate other aspects, such as teacher monitoring, teacher feedback, or reinforcements.

Why Self-Monitoring

1. Self-monitoring has an evidence base of effectiveness for increasing academic engagement and improving behavior.
2. Self-monitoring has been successfully used with high school students with other needs.
3. Self-monitoring is directed by the student and requires minimal teacher input and time.

Purpose of this Study

The purpose of this study is to see if self-monitoring increases either rates of academic engagement or respectful behavior for high school students with externalizing behavior problems.

What Are We Trying to Improve?

During this study we will see if self-monitoring improves the rates of one of the following behaviors.

- On-Task Behavior
  - On-task behavior is when a student is engaged on the assigned task.
- Respectful Behavior
  - Respectful behavior is when a student is displaying task-appropriate behaviors that do not disturb others.

Examples of On-Task Behavior

Examples of on-task behaviors include the following -

- Participating in a class-wide discussion.
- Working on an assigned task.
- Actively participating in a group assignment.
- Attending (looking at, or taking notes) teacher during direct instruction.

APPENDIX H (continued)

11/12/18

What is NOT an On-Task Behavior?

A student will determined to not be off task if they display the following behaviors -
- Speaking to a peer during instruction.
- Not paying attention to a teacher led activity (e.g., sitting with head down, out of seat).
- Not participating in group work .
- Refusing to work on a teacher assigned task.

Examples of On-Task Behavior

Examples of on-task behaviors include the following -
- Participating in a class-wide discussion.
- Working on an assigned task.
- Actively participating in a group assignment.
- Attending (looking at, or taking notes) teacher during direct instruction.

Can You Think of More Examples?

Examples of Respectful Behavior

Examples of respectful behavior include the following -
- Social interactions that are academically focused on assigned task
- Keeping hands and feel to oneself
- Verbal and nonverbal interactions that are academically focused and not disturbing others.
- Staying seated during academic activities

What Is NOT A Respectful Behavior?

A student will be determined to not be engaging in a respectful behavior if –
- Talking to a peer during academic instruction.
- Touching peers or other people's materials during instruction.
- Verbal or nonverbal communication that disturbs the learning environment.
- Leaving seat and walking around classroom.

Can You Think of More Examples?

APPENDIX H (continued)

11/12/18

How Do We Choose Which to Address?

- Interventions are most effective when they are matched to meet the individual needs of a student.
- To determine the needs of your student, we will conduct observations and conduct a functional assessment using a *Functional Assessment Screening Tool (FAST).*

What Is a Functional Assessment?

- Functional assessments are often used in educational settings to determine the function of a students behavior, especially as part of an IEP for students with behavior problems.
- The function of a students behavior is the reason the student is displaying the behavior. For instance, is a student acting out to avoid an academic task, or to receive attention.

What is the FAST Form?

- The FAST form is an initial screening form that can be used to identify factors that may influence a behavior.
- The FAST form has three sections
  – Social Influences on Behavior
  – Social Reinforcement
  – Nonsocial (Automatic) Reinforcement

Lets Look at a FAST Form

How do we use a FAST Form?
1. . Pick a student that has behavior problems that we can use as an example (not the student that will participate in this study).
2. Identify a specific behavior that the student displays.
3. Answer the 27 questions while thinking of the student and specific behavior.

How Do We Interpret the Results?

Lets practice scoring the FAST Form
1. Follow the directions in the "Scoring Summary" section.

2. Lets look at the results and discuss what they mean.

3. Any Questions?

Questions?

We are done with training session 1, do you have any questions?

Appendix I

Self-Monitoring Fidelity Checklist

Participant #: _____   Date: _____

Observer: _____   Class:_____

Total Points:_____   Fidelity %:_____

1) Did the student rate himself/herself at each interval?

   1- Less than half the time

   2- Most of the time, but not always

   3- Always or almost always

2) Did the teacher rate the student at each interval?

   1- Less than half the time

   2- Most of the time, but not always

   3- Always or almost always

3) Did the student and teacher meet to review their observations?

   1 – Yes

   2 - No

4) Did the teacher and student use all of the intervention components?

   1- Less than half the time

   2- Most of the time, but not always

   3- Always or almost always

APPENDIX J

6/11/19

Self-Monitoring

Training Session 1

Training_one_V1_12.5.18   1

Review Purpose of this Study

The purpose of this study is to see if self-monitoring increase the rates of academic engagement or respectful behavior for high school students with externalizing behavior problems.

Training_one_V1_12.5.18   2

What is Self-Monitoring?

• Self-monitoring is when a student is responsible for keeping track of their behaviors.
  – Self-monitoring can incorporate other aspects, such as teacher monitoring, teacher feedback, or reinforcements.

Training_one_V1_12.5.18   3

How Does Self-Monitoring Work?

• You will use an application on an iPad to keep track of your behavior.
• Every couple of minutes you and your teacher will record if you were displaying appropriate behavior.
• You will meet with your teacher to review your behavior for that class.
• You will review your data from day to day.

Training_one_V1_12.5.18   4

What Are We Going to Measure?

During this study you will keep track of your on-task behavior.

• Academic Engagement is
  – Academic engagement is when you are engaged on the assigned task.

Training_one_V1_12.5.18   5

Examples of Academic Engagement

Examples of on-task behaviors include the following -
• Participating in a class-wide discussion.
• Working on an assigned task.
• Actively participating in a group assignment.
• Attending (looking at, or taking notes) teacher during direct instruction.

Training_one_V1_12.5.18   6

What is **NOT** an Academic Engagement?

A student will determined to not be off task if they display the following behaviors -
• Speaking to a peer during instruction.
• Not paying attention to a teacher led activity (e.g., sitting with head down, out of seat).
• Not participating in group work .
• Refusing to work on a teacher assigned task.

Training_one_V1_12.5.18   7

Lets Practice

Is this an example of academic engagement?

"John is participating in a class discussion and raising his hand to answer questions. "

👍

Training_one_V1_12.5.18   8

What Are We Going to Measure?

During this study you will keep track of your on-task behavior.

• Respectful Behavior is
  – Respectful behavior is when you are displaying task-appropriate behaviors that do not disturb others.

Training_one_V1_12.5.18   9

APPENDIX J (continued)

6/11/19

Examples of Respectful Behavior

Examples of respectful behavior include the following -
- Social interactions that are academically focused on assigned task
- Keeping hands and feel to oneself
- Verbal and nonverbal interactions that are academically focused and not disturbing others.
- Staying seated during academic activities

Training one_V1_12.5.18   10

What Is **NOT** A Respectful Behavior?

A student will be determined to not be engaging in a respectful behavior if –
- Talking to a peer during academic instruction.
- Touching peers or other peoples materials during instruction.
- Verbal or nonverbal communication that disturbs the learning environment.
- Leaving seat and walking around classroom.

Training one_V1_12.5.18   11

Lets Practice

Is this an example of respectful behavior?

"John is using his pencils to play drums on his desk while the teacher is speaking"

Training one_V1_12.5.18   12

Lets Practice

Is this an example of respectful behavior?

"The person sitting next to John is trying to speak to him while the teacher is speaking, but John is not responding"

Training one_V1_12.5.18   13

Lets Practice

Is this an example of respectful behavior?

"Julie is is touching and playing with the hair of the student that sits in front of her"

Training one_V1_12.5.18   14

Lets Practice

Is this an example of respectful behavior?

"Julie is talking to her assigned partner using an appropriately leveled voice"

Training one_V1_12.5.18   15

Lets Practice

Is this an example of respectful behavior?

"During group work John is walking from group to group to talk to other students"

Training one_V1_12.5.18   16

Lets Practice

Is this an example of respectful behavior?

"Julie is playing a video on her phone while she is supposed to be working"

Training one_V1_12.5.18   17

Lets Practice

Is this an example of respectful behavior?

"John is helping the teacher organize the room after completing group work"

Training one_V1_12.5.18   18

APPENDIX J (continued)

6/11/19

Can you think of 2 examples of respectful behavior and two examples behaviors that are not respectful?

Training one_V1_12.5.18   19

Do you have any questions?

Training one_V1_12.5.18   20

Lets Practice

Is this an example of academic engagement?

"The teacher has given students time to complete and assignment, but John is drawing a picture?

Training one_V1_12.5.18   21

Lets Practice

Is this an example of academic engagement?

"Julie is sitting at her desk with her head down while the teacher is talking"

Training one_V1_12.5.18   22

Lets Practice

Is this an example of academic engagement?

"Julie is talking to her assigned partner about what they think is the correct answer"

Training one_V1_12.5.18   23

Lets Practice

Is this an example of academic engagement?

"John is sitting at his desk completing an assignment that is due in his next period class"

Training one_V1_12.5.18   24

Lets Practice

Is this an example of academic engagement?

"Julie's group is working on an assignment but she is sitting at her desk and not working"

Training one_V1_12.5.18   25

Lets Practice

Is this an example of academic engagement?

"Julie is taking notes while the teacher is giving a lesson"

Training one_V1_12.5.18   26

Lets Practice

Is this an example of academic engagement?

"John is silently reading an assigned text at his desk"

Training one_V1_12.5.18   27

APPENDIX J (continued)

6/11/19

Can you think of two examples of academic engagement and two examples of off-task behaviors that will occur in your class?

Training one_V1_12.5.18   28

Questions?

We are done with training session 1, do you have any questions?

Training one_V1_12.5.18   29

APPENDIX J (continued)

6/11/19

Self-Monitoring

Training Session 2

Training session two_1_V1_12/5/18   1

Purpose of this Study

The purpose of this study is to see if self-monitoring increases either rates of academic engagement or respectful behavior for high school students with externalizing behavior problems.

Training session two_1_V1_12/5/18   2

Lets start off by reviewing data

1. Lets review our SDQ score
2. Lets review our FAST data
3. Lets review our baseline data

Training session two_1_V1_12/5/18   3

Positively Stated Measures

Based on our data
1. What do you think is a positively stated academic engagement measure that we should use?
2. What do you think is a positively stated respectful measure that we should use?

Training session two_1_V1_12/5/18   4

Great Job

Now lets practice

Training session two_1_V1_12/5/18   5

Questions?

We are done with training session 1, do you have any questions?

Training session two_1_V1_12/5/18   6

CITED LITERATURE

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CURRICULUM VITAE

Skip Kumm
University of Illinois at Chicago
1040 W. Harrison St. (MC 147)
Chicago, IL 60607

EDUCATION

University of Illinois at Chicago
Doctoral Student in Special Education
Graduation Date: August 2019

University of Illinois at Chicago
Measurement, Evaluation, Statistics, and Assessment
Graduate Certificate in Educational Research Methodology, Spring 2018

National-Louis University
M.A. in Secondary Education, Special Education, May 2011

University of Dubuque
B.S. in Flight Operations, May 2006
Commercial Airline Pilot License

FELLOWSHIPS AND INTERNSHIPS

National Center for Leadership in Intensive Intervention – 2015-2019
Vanderbilt University – Doctoral Student Fellow
U.S. Department of Education - Office of Special Education Programs

Internship with Dr. Clayton Cook, Professor of Educational and Psychology – 2018 - Present
University of Minnesota
Topic: Assessment and Evaluation of FBA and BIP Components

PROFESSIONAL EXPERIENCES

2017 – Present   Graduate Assistant – Leaders Enhancing outcomes for Adjudicated Youth with Disabilities with Intensive Needs in Urban Settings.
U.S. Department of Education - Office of Special Education Programs, Grant Award number: H325D160074. Duties: Guide grant related research projects and organize summative reports.

2016 – Present   Graduate Assistant – Special Education Leaders for Urban Centers of Tomorrow.

U.S. Department of Education - Office of Special Education Programs, Grant Award Number: H325K170161. Duties: Guide grant related research projects and organize summative reports.

2016 – Present **Research Assistant** – CySec: A Cyber Security Collectable Card Game. National Science Foundation, Grant Award Number: 1623267. Duties: Guide grant related research projects.

2013 – 2016 **Special Education Teacher and Department Chair** – Chicago Public Schools, Nancy B. Jefferson Alternative High School – Cook County Juvenile Temporary Detention Center

2012- 2013 **Special Education Teacher and Case Manager** – Chicago Public Schools, Banner Academy West

TEACHING LICENSURE

Illinois State Board of Education – Learning and Behavior Specialist 1 (Special Education License), Technology Education, Social Science

PUBLICATIONS: PEER REVIEWED ARTICLES

1. **Kumm, S.**, Wilkinson, S, McDaniel, S., (In Press). Alternative Education Settings in the United States. *Intervention in School and Clinic*

2. Wilkinson, S., **Kumm, S.**, McDaniel, S. (In Press). Returning to the least restrictive environment: Transition from alternative education settings. *Intervention in School and Clinic*.

3. **Kumm, S.**, Maggin, D., Brown, C., & Talbott, E. (2019). A meta-analytic review of mental health interventions targeting youth with internalizing disorders in juvenile justice facilities. *Residential Treatment for Children & Youth, 36*, 235–256

4. **Kumm, S.**, Braun, G., Brown, C., Walte, S., Tejero-Hughes, M., Maggin, D., (2019). 3 Steps to success with MTSS: Administrators face challenges when it comes to guiding schoolwide processes, including multi-tier systems of support. *Communicator*. (42). Retrieved from https://www.naesp.org/communicator-march-2019/3-steps-success-mtss

5. Jolivette, K., Swoszowski, N. C., Kumm, S., Sanders, S., & Ansley, B. M. (2019). Embedding staff self-care into the MTSS framework for those working in juvenile correctional facilities. *Journal of Correctional Education, 70*, 2–19.

6. Thomas, M. K., Shjyka, A., Kumm, S. & Gjomemo, R. (2019). Educational design research for the development of a collectible card game for cybersecurity learning. *Journal of Formative Design Learning, 3*, 27-38.

7. Braun, G., **Kumm, S**., Brown, C., Walte, S., Tejero Hughes, M., & Maggin, D.M., (2018). Living in Tier 2: Educators' perceptions of MTSS in urban schools. *International Journal of Inclusive Education.* DOI: 10.1080/13603116.2018.1511758.

8. Talbott, E., Maggin, D.M., Van Acker, E. Y. & **Kumm, S**. (2018). Quality indicators for reviews of research in special education. *Exceptionality*, 26(4), 245–265 DOI: 10.1080/09362835.2017.1283625

9. Maggin, D. M., Talbott, E., Van Acker, E. Y., & **Kumm, S**. (2017). Quality indicators for systematic reviews in behavioral disorders. *Behavioral Disorders*, 42, 52-64 DOI:/10.1177/0198742916688653

PUBLICATIONS: UNDER REVIEW

1. **Kumm,** S., Gesel, S., Majeika, C., Talbott, E., Maggin, D.M. (2019). *Effects of targeted school-based mental health interventions for youth with internalizing disorders: A meta-analysis*. Manuscript submitted for publication.

2. **Kumm, S**., Mathur, S., Cassavaugh, M., (2019). *Adapting the PBIS framework to meet the mental health needs of youth in juvenile justice facilities. Remedial and Special Education*. Manuscript submitted for publication

3. House, L., Toste, J. R., & **Kumm, S.,** (2019). *A Synthesis of transition programs for Students with High-Incidence Disabilities*. Manuscript submitted for publication.

4. Talbott, E., Zurheide, J., Karabatsos, G., **Kumm, S.,** (2019) *Similarity in teacher ratings of the externalizing behavior of twins: A meta-analysis.* Manuscript submitted for publication.

CHAPTERS AND OTHER PUBLICATIONS

1. Jolivette, K., Kumm, S., Sanders, S., Royer, D., & Sprague, J. (2019). Facility-wide PBIS: Common questions from the Forum and field. National Technical Assistance Center on Positive Behavior Interventions and Supports. https://www.pbis.org/Common/Cms/files/Forum18_Presentations/RDQ9%20Brief%20-%20%20FWPBIS%20Common%20Questions.pdf

2. Sanders, S., Royer, D., Kumm, S., & Jolivette, K. (2019). Facility-wide PBIS implementation: Possible barriers and potential solutions for six salient topics as viewed by roundtable participants and facilitators. National Technical Assistance Center on Positive Behavior Interventions and Supports. https://www.pbis.org/Common/Cms/files/Forum18_Presentations/RDQ9%20Brief%20-%20FWPBIS%20Barriers%20&%20Potential%20Solutions.pdf

3. Jolivette, K., **Kumm, S.** (2018). *Resources for facility-wide PBIS implementation in juvenile corrections and residential settings/facilities: From adoption consideration to initial*

implementation to sustained implementation. https://www.pbis.org/community/juvenile-justice/fwpbis-resources

4. **Kumm, S**., & Jolivette, K. (2017). *Facility-wide PBIS implementation as viewed by roundtable participants and from the field. National Technical Assistance Center on Positive Behavior Interventions and Supports.* http://www.pbis.org/Common/Cms/files/Forum17_Presentations/RDQ%2010%20Brief%20-%20Juvenile%20Justice.pdf

5. Pennington, B., Pokorski, E.A., **Kumm, S**., & Sterrett, B.I. (2017). *Practice guide: School-based functional analysis*. Washington, DC: US Department of Education, Office of Special Education Programs.

6. **Kumm, S**. (In Press). Medium Humans have Medium Brains. In R. Summers (Ed.), *Developmental Psychology: Adolescent Depression*. Santa Barbara, CA: Greenwood.

PUBLICATIONS: IN PREPERATION

1. Ridden, B., **Kumm, S**., Maggin, D. (In Preparation). *A review of the evidence-base for intensive classroom management behavioral interventions*.

2. Kumm, S. (In Preparation). *Intensifying Goal Setting Interventions.*

3. Maggin, D.M., Kumm, S., Brown, C. (In Preparation). Group Contingency Interventions.

GRANTS

1. Jolivette, K., Sanders, S., Kumm, S., & Shaw, A. *(in review, 2019-2020). Understanding the implementation of behavior, academic, and social-emotional learning practices in residential and juvenile justice facilities symposia.* Spencer Foundation. ($49,999, Principal Investigator).

2. *Living Beyond the Walls: Listen to My Voice*. Principal Director. University of Illinois at Chicago, College of Education. Community Engagement Grant - $5,000.

PRESENTATIONS

1. Sanders, S., **Kumm, S.,** Ansley, B. M., & Jolivette, K. (2019, April). *I-CARE: Embedding a Self-Care Strategy for Staff in Juvenile Justice Facilities into the PBIS Framework.* Southeastern School Behavioral Health Conference, Myrtle Beach, SC

2. Ansley, B. M. **Kumm, S.,** Sanders, S. & Jolivette, K. (2019, April). *I-CARE Menu of Tiered Self-Care Strategies.* Southeastern School Behavioral Health Conference, Myrtle Beach, SC.

3. Maggin, D.M., Tejero-Hughes, M., Passmore, A. H., **Kumm, S.** (2019, April). Voices from the Field: Promoting Special Education Leadership. Presented at the American Educational Research Association (AERA) Annual Meeting, Toronto, Canada.

4. Thomas, M., Shjyka, A., **Kumm, S.** (2019, February). Culturally relevant pedagogy and collectible card games for cybersecurity and computer science education. Presented at the Annual College of Education Research Day, Chicago Il.

5. **Kumm, S**., Mathur, S., Gagnon, J. (2018, October). *Delivering Evidence-Based Mental Health Interventions as Part of a Facility-Wide PBIS Framework*. Presented at the Annual TECBD Conference, Tempe AZ.

6. McDaniel, S., Wilkinson, S., **Kumm, S.** (2018, October). *Transition Services from Alternative Education Settings to a Less Restrictive Environment.* Presented at the Annual TECBD Conference, Tempe AZ.

7. Majeika, C., Wilkinson, S., **Kumm, S.** (2018, October). *Thinking Functionally About Behavior: Helping Classroom Teachers Feasibly Assess Function of Behavior for Students with or At-Risk for EBD.* Presented at the Annual TECBD Conference, Tempe AZ.

8. **Kumm, S**., Passmore, A., Maggin, D., Tejero-Hughes, M. (2018, October). *Administrator and Teacher Perspectives on Promoting Special Education Leadership*. Presented at the annual Illinois Associated for Administrators in Special Education Conference, Tinley Park, Il.

9. Jolivette, J., Sanders, S., **Kumm, S**. (2018, October). *Facility-wide PBIS: The Basics, Adaptations, Benefits, & Resources*. Presented at the annual National PBIS Leadership Forum, Chicago, IL.

10. Jolivette, J., **Kumm, S**., Sanders, S., Royer, D. (2018, October). *Facility-wide PBIS in residential & juvenile facilities: Learning from other implementers*. Presented at the annual National PBIS Leadership Forum, Chicago, IL.

11. Vryhof, J., **Kumm, S.** (2018, April). *Centering Disability in Special Education*. Poster presented at the Chicago Disabilities Study Conference. Chicago, Il.

12. Wilkinson, S., Majeika, C., **Kumm, S**. (2018, March). *Intensifying Behavioral Interventions through a Data-Based Decision Making Process*. Presented at the Annual Association for Positive Behavior Support, San Diego, CA

13. Braun, G., **Kumm, S.,** Walte, S., Brown, C., Tejero Hughes, M., & Maggin, D. M. (2018, February). *Living in Tier 2: Educators' Perspectives of MTSS in Urban Elementary Schools*. Poster session presented at the Council for Exceptional Children Convention & Expo, Tampa, FL.

14. **Kumm, S**., Maggin, D.M., Brown, C., Talbott, E. (2018, February). *A Meta-Analytic Review of Interventions Targeting Internalizing Disorders in Juvenile Justice Facilities*. Presented at the Annual Midwest Symposium for Leadership in Behavior Disorders, Kansas City, MO

15. House, L. Toste, J. R., & **Kumm, S.** (2018, February). *Transition Programs and their Effects on Transition-Related Outcomes for Students with High-Incidence Disabilities*. Presented at the Pacific Coast Research Conference, PCRC, Coronado, CA

16. **Kumm, S.,** Vryhof, J., Parker-Katz, M., Bakare, A. (2018, February). *Building Collaborations to Support At-Risk Youth in Juvenile Detention.* Poster presented at the Annual Teacher Education Division of CEC, Savannah, GA

17. Braun, G., **Kumm, S**., Walte, S., Brown, C., Tejero Hughes, M., & Maggin, D. M. (2017, November). *Educators' Perceptions of MTSS in Urban Schools.* Poster presented at Teacher Education Division of the Council for Exceptional Children Conference. Savannah, GA.

18. **Kumm, S**., Maggin, D.M., Tejero-Hughes, M. (2017, November) *Administrators' Perspectives of Special Education Leadership*. Presented at the Annual Illinois Division of CEC, Naperville, Il

19. **Kumm, S**., Maggin, D.M., Brown, C., Talbott, E. (2017, October). *Examining Interventions for Internalizing Behaviors in Juvenile Justice Facilities: A Review and Look Forward*. Presented at the Annual TECBD Conference, Tempe, AZ. **(Invited Presentation)**

20. **Kumm, S**., Gesel, S., Majeika, C., Talbott, E., Maggin, D.M. (2017, October) *Combatting the silent epidemic in U.S. schools: A meta-analysis of targeted school-based mental health interventions*. Presented at the Annual TECBD Conference. Tempe, AZ.

21. **Kumm, S**. (2017, October). *A Meta-Analysis of Targeted School-Based Mental Health Interventions for Internalizing Disorders*. Poster presented at the Annual Illinois Division of CEC, Naperville, Il

22. **Kumm, S**., Braun, G., Brown, C., Walte, S., Tejero-Hughes M., Maggin, D.M. (2017, October) *Living in Tier 2: Educators' Perceptions of MTSS in urban Schools*. Presented at the Annual Illinois Division of CEC, Naperville, Il

23. Jolivette, K., **Kumm, S**. (2017, September) *Facility-wide PBIS implementation roundtable*. Presented at the Annual National PBIS Leadership Forum, Chicago, IL. **(Invited Presentation)**

24. **Kumm, S.,** Tejero-Hughes, M., Maggin, D.M. (2017, September). *Every teacher a leader: Enhancing special education leadership*. Presented at Illinois Alliance of Administrators of Special Education, Tinley Park, IL.

25. Braun, G., **Kumm, S**., Brown, C., Walte, S., Tejero-Hughes, M. (2017, April). *Living in Tier 2: Teachers' Perceptions of MTSS in Urban Schools* .Poster presented at AERA Conference, San Antonio, TX.

26. **Kumm, S.** (2016, September). *Juvenile Justice and School-Based Mental Health Interventions.* Presented at the bi-annual meeting of the National Center for Leadership in Intensive Intervention, Dallas, TX.

27. Braun, G, **Kumm, S.,** Christerralyn, B, Walte, S. (2016, January). *Living in Tier 2: Teachers' Perceptions of MTSS in Urban Schools.* Presented at the College of Education Research Day, Chicago, Il.

28. Thomas, M., **Kumm, S**., Vaughn, A. (2016, January). *CySec: A collectable card game for children*. Presented at the College of Education Research Day, Chicago, Il.

CONSULTING EXPERIENCE

Illinois Department of Juvenile Justice – Positive Behavioral Interventions and Supports Consultant. Duties: Provide consulting on facility-wide positive behavior supports, intensifying interventions for students with persistent behavioral and mental health needs, and collecting and analyzing data to inform interventions.

COLLEGIATE EXPERIENCE

University courses taught

SPED 448: Transition Services for Juvenile Justice Involved Youth (Summer, 2018, Fall 2018). This course utilized a hybrid model to teach four special education and four school social work masters level students about evidence-based practices in transition for juvenile justice involved youth.

Masters Level - SPED 579: Special Education Research (Spring of 2017, Fall of 2017). This course utilized a hybrid format to teach 13 masters levels students how to conduct quantitative and qualitative research in special education.

SPED 465: Understanding Students with High Incidence Disabilities (Fall, 2017) Teaching Assistant

SPED 448: Project PLUS Summer Internship (Summer, 2017). This course involved field experience for 13 masters level students. The students aided in developing multi-tiered systems of support for five Chicago public schools.

National Center for Leadership in Intensive Intervention. Faculty Contributor Module Nine: SEL, Behavioral, and Mental Health Interventions for Youth with Disabilities.

SERVICE

Student Advisory Board – Association for Positive Behavior Support

Ad-Hoc Journal Reviewer - Journal of Children and Family Studies, Journal of Emotional and Behavioral Disorders, Education and Treatment of Children, Behavioral Disorders

Guest Lecturer - SPE 612: Reading and Research in Special Education: Alternative Education Facilities Topic (Spring, 2019; **University of Alabama**), CIEP 332 School-Wide Applications of Learning and Social, Emotional, and Behavior Support (Fall, 2018; **University of Loyola**); ED 135 Child and Youth Policies in Urban America (Fall 2018); SPED 472 Academic and Pro Social Behaviors (Fall 2016, Spring 2017); SPED 592; Research in Special Education (Spring 2018); EDPS 135 Child and Youth Policies in Urban America (Spring 2018); SPED 4381 - Classroom and Behavior Management (Fall 2018; **University of Minnesota Duluth**)

Conference Proposal Review - Council for Exceptional Child
en (2016, 2017, 2018), Association for Positive Behavior Support (2018)

Advisory Board Member for Diverse Learners – Horizons for Youth (2018).

PROFESSIONAL MEMBERSHIPS

Association for Positive Behavior Support
American Educators Research Association
Council for Exceptional Children
Council for Exceptional Children – Council for Children with Behavior Disorders
Council for Exceptional Children – Division of Research
Council for Exceptional Children – Teacher Education Division
Society for Implementation Research Collaboration