POSITIVE BEHAVIORAL INTERVENTIONS AND SUPPORTS (PBIS) IMPLEMENTATION AND STUDENT PROBLEM BEHAVIORS: A CORRELATIONAL ANALYSIS

by

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DEDICATION

I dedicate this dissertation to my late father, Donald Arwood. For as long as I can remember, my dad told me I could do anything and be anything. When I told him I was going to be a teacher, his response was priceless: “Why would you want to be a teacher when you can be a doctor?!” He eventually learned that I could be both. While the colors of my tassels would have caused him GREAT distress (our family bleeds green), I know he would have been proud of me anyway. For my dad, I say, “Go green! Go white!”

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ABSTRACT

The number of schools implementing *Positive Behavior Interventions and Supports* (*PBIS*) is continually rising with multiple policies focused on PBIS to address behavioral concerns in schools. Additional research is needed to analyze if PBIS is leading to desired local outcomes. This study analyzed the association between PBIS *implementation* and *student problem behaviors*. Data were collected from Michigan's Integrated Behavior and Learning Support Initiative's (MIBLSI) School Climate Transformation Grant (SCTG) participating schools. The first research question asked if there was a statistically significant association between PBIS implementation as measured by the *Tiered Fidelity Inventory* (*TFI*) *Tier 1* percentage score and the rate of student problem behaviors as measured by office discipline referrals (ODR). Using the Pearson *correlation* coefficient, analyses revealed the association was not statistically significant. The second research question asked what the predictive validity of SWPBIS TFI Tier 1 percentage score and Tier 1 PBIS stage of implementation was on the rate of student problem behaviors. It was determined that the multiple regression analysis was not appropriate given a lack of linearity and homoscedasticity in the data set. Finally, the third research question asked if positive results could be generalized across demographic locales when Tier 1 PBIS is implemented with fidelity. Since findings for question one were not positive, this question was not addressed as planned. Results of this study indicate further research is needed to confirm the effectiveness of PBIS implementation on a reduction in ODRs and that the inclusion of additional variables would be beneficial to the analyses.

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INTRODUCTION

Positive Behavioral Interventions and Supports (PBIS) is a framework for addressing the non-academic needs of students in schools. These non-academic needs include the behavioral, social, emotional, and health aspects of a student's wellbeing (George, Kincaid, & Pollard-Sage, 2011; Horner & Sugai, 2015; Mathews, McIntosh, Frank, & May, 2014; Sugai & Horner, 2002, Sugai & Simonsen, 2012). The supports provided to students within this multi-tiered framework are commonly broken into three tiers. Tier 1 is commonly defined as the universal tier with supports and structures accessed by all students in the system. Tier 2 is commonly defined as a strategic or targeted level of support that is provided to some students who require more customized supports than the universal or Tier 1 supports in order to be successful. Tier 3 is commonly defined as an intensive and highly individualized level of supports which are provided to a few students who need customized supports in order to be successful. For educators, the installation of a PBIS framework within the school system is crucial to supporting successful social and academic student outcomes. Specifically, Tier 1 supports are of critical importance as they establish a safe and efficient environment allowing for effective teaching and learning to take place (George et al., 2011).

This correlational study sought to determine if PBIS implementation was associated with decreased levels of student problem behaviors. The study examined the predictive validity of two independent variables on the dependent variable of student problem behaviors measured by office discipline referrals (ODRs) at the end of the year per 100 students, per day using data from Michigan's Integrated Behavior and Learning Supports Initiative's (MIBLSI) School Climate Transformation Grant (SCTG) participating schools. The two independent variables related to

PBIS implementation were the School-Wide PBIS Tiered Fidelity Inventory (SWPBIS TFI) Tier 1 percentage score and the school's stage of implementation as determined by MIBLSI stage of implementation indicators for their SCTG participating schools (see Appendix E). If statistically significant associations were reported from the correlational study, an additional analysis would have been conducted to determine the external generalizability of the results across schools grouped by locale: city, suburb, town, and rural. The unit of analysis of this study was at the school level. The study focused on schools within the state of Michigan who were a part of the SCTG cohort and were entering data into MIBLSI's data warehouse, MIDATA. Given the backdrop concerning the intended study, this introduction chapter has included the following sections: a) problem statement and research questions, b) purpose of the study, c) significance of the study, e) study's delimitations, and f) key definitions.

Problem Statement and Research Questions

Like many other states across the nation, Michigan has funded efforts to support schools in PBIS (Dunlap, Goodman, McEvoy, & Paris, 2010). In support of PBIS implementation at the local and regional level, Michigan's Department of Education chose to invest both state and federal funding into MIBLSI for over a decade. MIBLSI is an Individuals with Disabilities Education Act (IDEA) grant funded initiative through the Michigan Department of Education's Office of Special Education (MIBLSI, n.d.). While MIBLIS has multiple streams of funding supporting their work in Michigan, a majority of their funding is IDEA related. This initiative supports local education agencies, both intermediate school districts and local school districts, in implementing multi-tiered systems of support for reading and behavior. Districts and schools across the state of Michigan are interested in finding an effective and efficient manner to address the multiple needs of all students by supporting their social, emotional, and behavioral development in a systematic way. PBIS offers district and school leaders a multi-tiered behavioral supports model to promote students' social, emotional, and behavioral competencies. Through the work of the MIBLSI project, schools and districts have been utilizing a fidelity measure that was recently developed to assess PBIS implementation. This tool is the SWPBIS TFI, and it measures the level to which PBIS is being implemented with fidelity at the school system level. Fidelity of implementation is defined as the degree to which a program, intervention, or practice is put into place as it was originally designed (Lane & Beebe-Frankenberger, 2004). With the use of TFI data across the SCTG participating schools, MIBLSI is able to show the impact that their supports have on the level of implementation of PBIS in schools and districts. In addition, all schools working with MIBLSI are using the School-Wide Information System (SWIS) database to track student outcome data in the form of office discipline referrals (ODRs). Since PBIS is a crucial area of focus for districts and schools looking to support the non-academic needs of students, it is imperative that the effects of PBIS implementation, including the effects of data-based decision making, are analyzed to inform educational leaders about the benefits these efforts will have on student outcomes.

PBIS is a commonly implemented educational framework in schools with over 25,000 currently implementing (OSEP, 2018). PBIS is often found in literature and legislation around general and special education as it is a system to support all students. While the research conducted around PBIS includes effectiveness of PBIS at decreasing problem behaviors, there is a need for additional studies around the association between the threshold of fidelity and a decrease in student problem behaviors. Given that implementation occurs in stages, there is a need for studies addressing the predictive validity of implementation fidelity and stage of implementation on the rate of student problem behaviors. There is also a need for research around the generalizability of expected outcomes across schools grouped by locale (city, suburb, town, and rural), as this information will support educators in each of these locales to justify supporting PBIS overtime in their unique context. In an effort to provide local superintendents in the state of Michigan with a compelling reason to continue supporting PBIS after local, state, and federal grants have ended, a quantitative analysis of a correlational design was conducted to determine the predictive validity of Tier 1 PBIS implementation fidelity to student outcomes. Analysis was conducted based on stage of implementation as well as fidelity assessment scores to demonstrate the effectiveness of PBIS at supporting schools in decreasing student problem behaviors. With the need to further support research around the effectiveness of PBIS at addressing student behaviors, the following research questions were considered in this study:

1. ***Is there a statistically significant association between School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score and the rate of student problem behaviors as measured by office discipline referrals reported in SWIS?***

2. ***What is the predictive validity of School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score and Tier 1 PBIS stage of implementation on the rate of student problem behaviors as measured by office discipline referrals reported in SWIS?***

3. ***Given a positive finding in question one, is there external generalizability across demographic locales (city, suburb, town, and rural) after controlling for stage of implementation when Tier 1 of PBIS is implemented with fidelity as measured by the School-Wide PBIS Tiered Fidelity Inventory?***

This study pursued answers to these research questions based on an analysis of TFI data, school stage of implementation, school demographic data, and student outcome data.

Purpose of the Study

This study could be used to inform the educational community of outcomes expected from implementing Tier 1 of PBIS with fidelity. This study's aim was to provide additional support examining PBIS fidelity and student outcomes and offer additional evidence around the 70% fidelity threshold found in the study conducted by Mercer, McIntosh, and Hoselton (2017). However, this study has demonstrated similar outcomes to other studies around the effects of PBIS implementation on the rate of office discipline referrals, thus making this a replication of previous research (Childs et al., 2015; Gage et al., 2018). Additionally, districts and schools are looking to find a framework to address students' non-academic needs that is matched to their specific context. Implementation of PBIS includes establishing leadership teams who will examine fidelity data along with other data (e.g., student outcome, demographic, capacity, etc.) to ensure the best supports are being provided to their students. Through an analysis of results across school demographics, this study aimed to provide districts with information regarding the level of variability in outcomes when Tier 1 is implemented with fidelity within specific locales. This study could also be used to provide information to political leaders affecting policies and funding for districts and schools around non-academic needs.

Study's Significance

Research has demonstrated numerous times that supporting students' non-academic skills, such as behavior, social, emotional, and health, supports their academic achievement (Bradshaw, Mitchell, & Leaf, 2010; Horner et al., 2009; Luiselli, Putnam, Handler, & Feinberg; 2005; Muscott, Mann, & LeBrun, 2008; Najaka, Gottfredson, & Wilson, 2002). For this reason, Michigan has supported ongoing efforts to establish effective multi-tiered behavioral frameworks within each district and school building across the state (MIBLSI, n.d.; Michigan Department of Education, 2017; Michigan State Board of Education, 2006; Revised School Code, 2017). The MIBLSI project has applied for and received multiple grants (state and federal) over the years, including the SCTG. These opportunities have allowed MIBLSI to increase staff and supports for local districts and schools. Even though MIBLSI has targeted strengthening the supports provided to partnering local education agencies (LEA), implementation has not yet reached fidelity and has not been sustained in some areas. Given that this is an area of high importance across the educational community and specifically in the state of Michigan (Every Student Succeeds Act, 2015; MIBLSI, n.d.; Michigan Department of Education, 2017; Michigan State Board of Education, 2006; Revised School Code, 2017), research was conducted to determine if there was a statistically significant association between Tier 1 PBIS implementation and decreased student problem behaviors. If statistically significant results were found with the correlational study, an additional analysis of variability was intended to be conducted to determine if there was variability in these results across the school locales (e.g., city, suburb, town, and rural). These results could potentially be helpful to the field of education as a whole in assisting schools and districts with PBIS implementation, sustaining these efforts over time, making data-based decisions, and lobbying for resources to support this work based upon the school’s unique context and needs. The results of this study could justify the need for PBIS supports to be sustained overtime in order for positive outcomes to be fully realized. With this information, schools and districts are encouraged to support ongoing, sustained efforts to scale up implementation of PBIS within their organizations.

In addition, the process of implementing and sustaining a PBIS framework is closely connected to multiple professional standards for educational leaders. When looking at the Professional Standards for Educational Leaders from the National Policy Board for Educational Administration (2015), two of these standards align closely with the study's purpose and significance. Standard three states, "Effective educational leaders strive for equity of educational opportunity and culturally responsive practices to promote *each* student's academic success and well-being" (p. 9). This standard further delineates how educational leaders do this in saying that the leader will promote practices that support the academic and social needs of individual students. This standard also states that educational leaders will address matters of equity and cultural responsiveness in their buildings. This is exactly the type of practice that PBIS supports leaders in doing. PBIS requires that leaders not only establish a foundation of trust and a positive climate and culture in their buildings, but it also requires that leaders stay attune to the diverse needs of the students on an individual basis. Tools such as SWIS allow leaders to drill down into their information to discover issues of bias and disproportionality in discipline issues. Once these issues are recognized, leaders in a PBIS system take steps to reduce or eliminate the barriers to positive success that their students and staff might be facing.

Standard five also aligns well with the goals of implementing a PBIS framework. Standard five states, "Effective educational leaders cultivate an inclusive, caring, and supportive school community that promotes the academic success and well-being of *each* student" (p. 10). This standard explains that educational leaders not only ensure that the students are successful in academics, but the leader makes sure that the students have a safe, caring, and healthy learning environment and that the social, emotional, and physical needs of each student are met. This is done by providing a system of academic and social supports to meet the range of needs present in the building. The most significant sub-point in this standard that aligns perfectly to PBIS states that the leader cultivates an environment that reinforces positive student conduct. Not only does PBIS establish routines and expectations around behavior in the school, it also establishes a systematic way of reinforcing positive behavior and supporting students who might be struggling with social, emotional, or physical needs that are creating barriers to their success. Through the implementation of a PBIS framework, educational leaders are meeting the expectation of this standard.

Delimitations

To validate the study and make it manageable and feasible, delimitations were established. The researcher established validating criteria for all data collected. The researcher worked with MIBLSI staff to access data. MIBLSI staff pulled data from the MIBLSI data warehouse, MIDATA, related to Tier 1 PBIS implementation, stage of implementation, the rate of student problem behaviors, and school demographic information related to school locale for their SCTG participating schools. The data stored in this warehouse was entered by school and district personnel and was monitored by the MIBLSI liaison supporting their implementation efforts. All data were reported from the use of the same fidelity tool (TFI) and the same student behavior database (SWIS). The use of the TFI and SWIS ODR information further validated the study in that these tools have been researched and vetted on a national level.

Key Definitions

To comprehend fully the aspects of this study, it is imperative that certain terms and practices are clearly defined. One of the major understandings that needs to be established is a clear definition of PBIS. According to the *Handbook of Positive Behavior Support*, PBIS is defined as "an approach designed to improve the adoption, accurate implementation, and sustained use of evidence-based practices related to behavior and classroom management and school discipline systems" (Sugai & Horner, 2011, p. 309). The definition also states that PBIS is not a packaged curriculum but a preventative framework for schools to organize evidence-based practices designed to improve student outcomes, improve their implementation of evidence-based practices designed to improve student outcomes, and maximize academic and social outcomes for all students. The student outcomes that are realized are both behavioral and academic in nature. As students are able to exhibit socially acceptable behaviors, they are able to participate more in academic opportunities, thereby increasing their academic outcomes as well (Luiselli, Putnam, Handler, & Feinberg, 2005; Muscott, Mann, & LeBrun, 2008; Najaka, Gottfredson, & Wilson, 2002). In short, PBIS is a framework that cannot be purchased or simply adopted; it needs to be built within the school system. PBIS is often interchanged with terms like multi-tiered or tiered behavioral framework, school-wide positive behavioral (intervention) supports, and positive behavioral supports (OSEP, 2018).

With PBIS being a multi-tiered framework, a solid understanding of the PBIS tiers is essential to empower educators and clarify terminology used in this study. George et al. (2011) define Tier 1 as a universal, primary prevention system established to support all students in all settings. They state that Tier 1 has the potential to prevent problem behaviors and even reduce the amount of risk for students in the system. They identify seven practice components of a Tier 1 PBIS system: a) a committed leadership team; b) a system to support data-based decision-making; c) procedures for responding to problem behaviors; d) behavior expectations that are positively stated; e) procedures for encouraging students to meet behavior expectations; f) lesson plans for teaching behavior expectations; and g) a plan for monitoring and evaluating implementation efforts (George et al., 2011, p. 384). Given that the goal of PBIS is to prevent problem behaviors and support students in their academic and non-academic outcomes, Tier 1 is foundational to the success of this work. While all students receive the support of Tier 1, it is considered effective only when it is meeting the needs of around 80%-90% of the students in a school (George et al., 2011). However, some students will need additional supports. Tier 2 and Tier 3 provide these additional supports to students who need more than what is established in Tier 1. Tier 2 is defined as a secondary level of prevention that is designed to reduce the number of cases of student problem behaviors. Tier 2 interventions are often referred to as "selected" or "targeted". This tier is meant to address the needs of student(s) or groups of students who need targeted supports to be successful. Tier 2 serves approximately 10-15% of the student population who are at risk of developing severe problem behaviors (Hawken, Adolphson, MacLeod, & Schumann, 2011). Tier 3 is defined as a tertiary level of support that is designed to address the specific conditions associated with individual problem behaviors. This tier is considered an intensive, individualized level of support that is often characterized as data driven and team based. This tier of supports typically serves around 5% or fewer of the students in the school (Sugai & Horner, 2011). In addition, Tiers 2 and 3 should be considered additive in nature. While PBIS is comprised of all three tiers, this study focused on implementation fidelity and student outcomes based on Tier 1 supports only.

Another key aspect of this study is implementation science. According to Ogden and Fixsen (2007), "implementation is defined as a specified set of activities designed to put into practice an activity or program of known dimension" (p. 4). The formula for implementation's success requires effective innovations combined with effective implementation within an enabling context. The combination of these three elements creates a high likelihood of socially significant outcomes. Additionally, Ogden and Fixsen (2007) define three implementation drivers and four implementation stages. The implementation drivers are leadership, organization, and competency. Leadership drivers are conceptualized as both technical (e.g., time, funding) and adaptive (e.g., motivation, clinical inertia). Organizational drivers are systems intervention (e.g., managerial support), facilitative administration (e.g., immediate appointment, time, caseload), and decision support data system. Competency drivers are selection (e.g., staff attitudes, receptivity to training, not part of role), training (e.g., intervention training, knowledge, belief in usefulness), and coaching (e.g., support after training, comfort with topic, rapport with client/stakeholder). The four stages of implementation are exploration, installation, initial implementation, and full implementation. Exploration is the stage in which organizations research innovations that would help them reach their goals. They also assess their readiness to implement successfully. In the installation stage, organizations gather all resources needed, select staff for training and coaching, and select assessments that will be used to measure the effectiveness of the innovation. During initial implementation, organizations begin implementation of the innovation within the appropriate context. It is often within this stage that organizations identify areas needing to be tweaked or system structures that need to be put in place in order for the innovation to be successful. Many organizations will often find that there is a need to go back and set up structures or gather resources that were missed during the installation stage, but this is not considered a step backward; it is actually considered a step forward as proper installation is crucial to the organization reaching the final stage of full implementation. It is also found within the research that this stage is only successful if there is an implementation team designated to support and monitor implementation efforts. Without such a team, research has shown that the organization will only be about 14% implemented after seventeen years of working at it (Ogden & Fixsen, 2014). The final stage is full implementation. In this stage, organizations must reach 50% of their staff implementing with fidelity and showing intended outcomes. At this point, some organizations are able to expand the innovation to new contexts in order to replicate their success. Time is a key factor in implementation as well. Fixsen, Naoom, Blasé, Friedman, and Wallace (2005) found that little research has been done around the impact of time on realizing positive outcomes when evidence-based practices are implemented. They state that extensive planning efforts must be made to conduct research around the significance time plays on reaching implementation goals.

A deep understanding and clear definitions of fidelity and sustainability are crucial to PBIS implementation. According to the Montana Office of Public Instruction, fidelity is the degree or extent to which a program is implemented as planned and is defined as “the accurate and consistent application of an agreed upon procedure” (Montana Office of Public Instruction, 2016). Lane and Beebe-Frankeberger (2004) reiterate this definition in stating fidelity is “the degree to which the intervention plan was put into place as originally designed” (p. 128).

This study defined fidelity as the implementation of PBIS in its intended form, including all critical features. This study measured fidelity using the TFI, which specifies the critical features as teams, implementation, and evaluation. This tool allows PBIS leadership teams to assess their level of implementation and to determine if they are implementing with fidelity (Algozzine et al., 2014). Finally, McIntosh, Horner, and Sugai (2009) state that sustainability is defined as the durable implementation of a practice at a level that continues to produce valued outcomes. When it comes to PBIS outcomes, implementation fidelity is a direct reflection of the adult actions in the school and is one of the most critical outcomes to measure (Bradshaw, Pas, Debnam, & Lindstrom Johnson, 2015). This means that sustainability is defined not only as a continuation of positive outcomes in terms of student success, but it is also defined by high levels of implementation fidelity. Research suggests that PBIS implementation fidelity is reached when schools receive a score of 70% on fidelity assessments and maintain this score over time (Algozzine et al., 2014). For purposes of this study, a 70% score on the TFI was considered implementing with fidelity. In addition, this study sought to confirm that a score of 70% fidelity is a threshold for outcomes as was determined by a study conducted by Mercer, McIntosh, and Hoselton (2017). Their study found significant outcomes were not realized or correlated to implementation fidelity of the core features of PBIS on multiple fidelity tools when the school reported a score of less than 70%. Only when a school reached the 70% threshold did the data indicate that there were consistent, statistically significant positive student outcomes.

This study also sought to explore the generalizability of issues around equity and disproportionality in discipline through the analysis of positive outcomes across the demographic locales of city, suburb, town, and rural. According to McRoy, Fong, and Dettlaff (2014), disproportionality is defined as the ratio between the percentage of people in a specific racial or ethnic group being negatively over-identified in comparison to their percentage of the overall population. Research has shown that disciplinary practices in schools have been inequitable and have over identified students in minority populations (e.g. special education, African American, etc.), which punishes these groups disproportionately (Fenning & Rose, 2007; Girvan, Gion, McIntosh, & Smolkowski, 2017; McIntosh, Nese, & Horner, 2016; Skiba et al., 2002; Smolkowski, Girvan, McIntosh, Nese, & Horner, 2016). However, emerging research has shown implementation of PBIS can reduce disproportionality and increase equity in student discipline (Bal, Kozleski, Schrader, Rodriguez, & Pelton, 2014; McIntosh, Girvan, Horner, Smolkowski, & Sugai, 2014). In an effort to begin preliminary analysis around the generalizability of PBIS effects on equity and disproportionality, an analysis of variance was planned to be conducted around groups of schools based on their demographic labels (locales) as determined by Michigan's Department of Education. Michigan's Center for Education Performance and Information or CEPI identifies schools as one of four main categories: city, suburb, town, or rural (CEPI, 2016). Each of these four categories is broken into the three subcategories; however, this study focused on the four main categories. (Subcategories are defined in Table 1.1.) A city is defined as a "territory inside an urbanized area and inside a principal city" with a population ranging between less than 100,000 to more than 250,000 (CEPI, 2016, p. 21). A suburb is defined as a "territory outside a principal city and inside an urbanized area" with a population ranging between less than 100,000 to more than 250,000 (CEPI, 2016, p. 21). A town is defined as a "territory inside an urban cluster" and outside of an urbanized area (CEPI, 2016, p. 21). A rural area is defined as a "census-defined rural territory" that is outside of an urbanized area and outside of an urban cluster (CEPI, 2016, p. 21). Michigan came to these definitions through the use of data from the United States Census Bureau. The United States Census Bureau classifies locales as either urban or rural. According to Ratcliffe, Burd, Holder, and Fields (2016), urban locales are broken into two categories: urban areas and urban clusters. These categories are defined based on population density as well as other determining factors. Urban areas are those with 50,000 or more people with a density of 1,000 people per square mile. They also use a calculation to account for residential and non-residential land use that could allow a locale to be identified as urban with only 500 people per square mile. An urban cluster is an area with at least 2,500 people but less than 50,000 people. An urban cluster must also have at least 1,000 people per square mile or 500 people with the adjusted calculation for residential and non-residential land use. Rural is then defined as “all population, housing, and territory not included within an urbanized area or urban cluster” (Ratcliffe et al., 2016, p. 3). When analyzing the outcomes of schools across Michigan, definitions set by the Michigan Department of Education were planned to be used to determine if positive effects of PBIS implementation could be realized in any school regardless of their locale.

Table 1.1: Locale Definitions

Locale	Subcategory	Definition
City	Large	Territory inside an urbanized area and inside a principal city with (a) population of 250,000 or more
	Midsize	Territory inside an urbanized area and inside a principal city with (a) population of less than 250,000 and greater than or equal to 100,000
	Small	Territory inside an urbanized area and inside a principal city with (a) population of less than 100,000
Suburb	Large	Territory outside a principal city and inside an urbanized area with (a) population of 250,000 or more
	Midsize	Territory outside a principal city and inside an urbanized area with (a) population less than 250,000 and greater than or equal to 100,000
	Small	Territory outside a principal city and inside an urbanized area with (a) population less than 100,000
Town	Fringe	Territory inside an urban cluster that is less than or equal to ten miles from an urbanized area
	Distant	Territory inside an urban cluster that is more than ten miles and less than or equal to thirty-five miles from an urbanized area

	Remote	Territory inside an urban cluster that is more than thirty-five miles from an urbanized area
Rural	Fringe	Census-defined rural territory that is less than or equal to five miles from an urbanized area, as well as rural territory that is less than or equal to two-and-a-half miles from an urban cluster
	Distant	Census-defined rural territory that is more than five miles but less than or equal to twenty-five miles from an urbanized area, as well as rural territory that is more than two-and-a-half miles but less than or equal to ten miles from an urban cluster
	Remote	Census-defined rural territory that is more than twenty-five miles from an urbanized area and is also more than ten miles from an urban cluster

Note: CEPI (2016, p. 21-22)

Finally, this study partnered with MIBLSI to access TFI, ODR, PBIS stage of implementation, and demographic data for SCTG participating schools across Michigan. It is important to understand that schools and districts partnering with MIBLSI receive support through an intentionally designed scope and sequence of training, coaching, and technical assistance. With the launch of their first project and cohort of schools seeking support in 2004, MBLSI began offering training, coaching, and technical assistance to schools who were interested in looking at both PBIS and reading strategies to deploy systematically throughout their schools. From 2004-2013, MIBLSI supported seven cohorts of schools with this model. In 2011, they moved to a regional-based model to support capacity development in regional service agencies in the areas of behavior and reading. In 2016, MIBLSI moved to a district model, which allowed them to support districts directly in building multi-tiered systems of support for behavior and reading. In addition to their integrated academic and behavior model, MIBLSI also holds various federal grants that allow them to focus their supports on specific work. One of these grants is the SCTG, which was awarded to the Michigan Department of Education (MDE) in

2014. This grant focuses on supporting PBIS implementation at the district and school level. Direct supports to districts and schools began in 2015, with initial data collection beginning in the 2016-2017 school year. Given that this grant project is focused only on PBIS implementation and that there was a need to justify continued funding from the United States Department of Education, this study only used data from the SCTG participating schools. Data were collected for both the 2016-2017 and 2017-2018 school years.

Chapter Summary

This chapter has introduced the proposed correlational study around the association between Tier 1 PBIS implementation fidelity and decreased student problem behaviors. The original intent of this study was to conduct a study of predictive validity that was a progression of analyses leading to a multiple regression including analysis of stage of implementation in relation to student outcomes. Being that stage of implementation has not been analyzed by the institution housing the study's data set, this study was targeted to be a unique contribution to the field. Additionally, if statistical significance would have been found in the correlational analysis related to the first question, an analysis of variance around subgroups of schools would have allowed the results of this study to determine external generalizability. Background information around the purpose and significance of the study was reviewed. This chapter also provided connections to educational leadership as well as delimitations of the study. Key terms were defined in order to establish a clear understanding of the components of the study.

CHAPTER TWO

LITERATURE REVIEW

This literature review will analyze and synthesize the history, themes, and methodologies of multiple sources and studies around the implementation of Positive Behavioral Interventions and Supports (PBIS), which can also be referred to as School-Wide Positive Behavioral Interventions and Supports (SWPBIS). One of the chapter's purposes is to help the reader understand the context leading to PBIS as a fundamental framework to support students. Another purpose is to identify common elements that support sustained implementation of PBIS practices as well as expected outcomes when fidelity is reached. The final purpose of this chapter is to validate this study's selected methodology. The first section of the review will provide the reader with the historical background and development of PBIS as a critical framework for districts and schools to address students' non-academic needs. The second section will synthesize literature and identify common themes, findings, and gaps that support the proposed research problem and research questions. The third section of this chapter reviews methodologies used by researchers to determine the association and predictive validity of independent variables on dependent variables.

Historical Review

Since as early as 1642 when the Massachusetts Bay Colony began offering Puritan education so that children could learn to read the Bible (Campbell, 2015), teachers have faced the challenge of addressing student problem behaviors. Multiple methods for addressing these challenges have been utilized with varying results. There has also been a tremendous amount of controversy over their effectiveness to shape student behaviors as well as to inflict unintended negative consequences on students. Given that people and systems evolve over time, a historical perspective and understanding of how student behaviors have been addressed in districts and schools as well as the effects of the various methods are critical for understanding why the shift has been made to a PBIS framework.

Corporal punishment. As the educational system began developing in the United States, most schools focused on religious studies rather than on subjects taught today, such as reading, math, or science. The intent was to teach children the basic Christian values around family, religion, and community (Campbell, 2015). The foundation of religion in schools led educators to take a biblical approach to addressing student behaviors and discipline. One scripture that was taken from the Bible and was used to justify the method of punishment for behavioral missteps was Proverbs 13:24, which states, “He who spares his rod hates his son, but he who loves him disciplines him promptly” (New King James Version; Dukes, 2009). While this is only one biblical scripture relating to disciplining children and could be interpreted in numerous ways, Campbell (2015) uses this as an example of how educators justified corporal punishment in the earliest establishments of public education. From this early beginning, districts, schools, and educators began using corporal punishment as a way to make students conform to school rules and behave in a manner that district and school officials deemed appropriate.

Corporal punishment in schools is defined by the American Academy of Child and Adolescent Psychiatry as “a discipline method in which a supervising adult deliberately inflicts pain upon a child in response to a child's unacceptable behavior and/or inappropriate language” (American Academy of Child and Adolescent Psychiatry, 1998). One of the most common forms of corporal punishment utilized in schools was paddling. When students misbehaved, teachers would have them bend over so that they could paddle their buttocks. Other common forms of corporal punishment in schools included hitting, spanking, and slapping. Some reports have indicated the use of objects other than paddles to inflict pain on students, including shoes, belts, rulers, hammers, and metal pipes. Some children have even been choked, pinched, and dragged by their hair in an effort to shape their behaviors (Gershoff, Purtell, & Holas, 2015). The effects of corporal punishment are not limited to the physical pain and injury imposed upon a student. Rollins (2012) found corporal punishment may adversely affect a student's self-image and academic achievement. Additionally, Rollins found punishment can lead to disruptive and violent behaviors and can severely alter social skills development. Corporal punishment has other negative unintended consequences such as providing a model of aggression for students to follow, teaching that physical responses are acceptable, decreasing attendance rates, reducing opportunities for academic learning, and creating aversions to those delivering the punishments (Dukes, 2009).

While many states recognized the harmful effects of corporal punishment and made the use of it illegal in schools, a report in *USA Today* in July of 2017 stated that fifteen states in the United States continue to allow this form of discipline in schools (Alvarado, 2017). These states include Florida, Georgia, North Carolina, South Carolina, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, Arkansas, Missouri, South Dakota, Wyoming, and Arizona. Even though the Eighth Amendment protects prisoners from corporal punishment, the U.S. Supreme Court ruled in 1977 that this same protection did not apply to students in schools (*Ingraham v. Wright*, 1977). Additionally, animals are a protected subgroup from corporal punishment. The only subgroup of people in the United States who are not protected from corporal punishment are children (Gershoff, Purtell, & Holas, 2015). Many states have legally banned its use as a form of discipline in districts and schools as they are more increasingly aware of the detrimental and counterproductive effects of corporal punishment on children.

Zero tolerance, suspension/expulsion, and dropout. While the use of corporal punishment was diminishing across the nation, schools and districts were continuing to deal with increasing student problem behaviors. In the early 1990s, zero tolerance policies began infiltrating districts and schools in response to increasing violence among youths (Shah, 2013). For example, a school district in San Diego institute a zero tolerance policy after two students were shot and killed. Their policy allowed them to expel any student who brought a weapon to school in an effort to protect the masses (Vail, 1995). With mass shootings happening in school across the nation, there was a need for quick intervention on behalf of the safety of all students (Astor et al., 1997; Borum et al, 2010). The introduction of zero tolerance policies allowed school administrators to expel a student for a full year if they brought a weapon to school. However, this policy did not limit the use of expulsion to students bringing weapons to school, and many school administrators widened their local expulsion policies to include other behaviors as well (Evans & Lester, 2012). The American Psychological Association Zero Tolerance Task Force eventually defined zero tolerance as “a philosophy or policy that mandates the application of predetermined consequences, most often severe and punitive in nature, that are intended to be applied regardless of the gravity of behavior, mitigating circumstances, or situational context” (American Psychological Association, 2008, p. 852). In many cases, the predetermined consequences students face for their misbehavior were exclusionary in nature, causing them to miss out on the opportunity for exposure to academic content and alienating them from certain social contexts. Many educators believed this practice would teach the students to change their behavior while also teaching other students to avoid such disruptive behaviors (Ewing, 2000). As these practices grew and more students were excluded from educational settings, students with disabilities were experiencing increasingly more exclusionary consequences. This practice spurred civil rights issues across the country (McCarthy & Soodak, 2007). Along this same timeframe, the federal Gun-Free Schools Act of 1994 (a subsection of the Elementary and Secondary Education Act) came out, which further supported the use of zero tolerance policies in schools in order to maintain a safe and orderly environment. This act required that each state receiving federal funds under the Elementary and Secondary Education Act have a state law requiring local education agencies to expel students from school for one year if they brought a firearm to school. This law did not, however, prohibit the lawful carrying of a firearm on school property (Gun Free Schools Act, 1994).

However, multiple researchers have found zero tolerance policies to cause more harm to students than they were correcting behavioral problems. Martinez (2009) reports many district and school administrators were misusing and abusing zero tolerance policies resulting in a higher frequency of student suspensions and expulsions. With the original intention of zero tolerance policies being used to decrease problem behaviors as students learned the consequences associated with their choices, one would expect that suspensions and expulsions would decrease. However, according to a report from the National Association of School Psychologists (NASP, 2001), suspensions and expulsions increased under the zero-tolerance era with students from minority status backgrounds and students with disabilities being disproportionately impacted. Gage, Sugai, Lunde, and DeLoreto (2013) examined the effects of high school practices and their zero-tolerance policies related to student unexcused absences and found that student grades suffered under the policy, which led to a trajectory of increased dropouts. These findings were consistent with the American Psychological Association's Zero Tolerance Task Force stance that zero tolerance policies often have unintended consequences for students and do not effectively target the behaviors they were intended to address (American Psychological Association, 2008). In addition to disproportionality in the use of zero tolerance policies, Startz (2016) of the Brookings Institution found Black students were twice as likely to receive corporal punishment as their White counterparts. Findings like these led researchers to analyze disproportionality and find ways to reduce and diminish the overrepresentation of minority subgroups within school discipline practices.

The unintended consequences of zero tolerance policies, as described above, are that many students were being suspended and expelled from public schools across the nation without consideration being given to their individual needs or the supports they might require to help them make positive, prosocial decisions. In a 2011 report from the Council of State Governments' Justice Center, an analysis of almost one million secondary students found over half of the students had been punished by suspension or expulsion. The result of the study showed those students who had received suspensions or expulsions were significantly more likely to dropout than students who had not been punished for their behavior through suspension or expulsion (Fabelo, Thompson, Plotkin, Carmichael, Marchbanks, & Booth, 2011). Teaching Tolerance is an organization established with the mission to "reduce prejudice, improve intergroup relations and support equitable school experiences for our nation's children" (Southern Poverty Law Center, 2018, p. 1). They provide reports and statistics on a phenomenon called the school-to-prison pipeline. The school-to-prison pipeline is defined by the American Civil Liberties Union as “a disturbing national trend wherein children are funneled out of public schools and into the juvenile and criminal justice systems” (American Civil Liberties Union, 2018, p. 1). Teaching Tolerance reports that major contributors to the school-to-prison pipeline are the reactionary, punitive policies adopted and measures taken by districts and schools in response to student behaviors resulting in suspension and out-of-class time (Elias, 2013). Elias also reports Black students, while only accounting for 18% of the district and school populations across the nation, make up 46% of suspensions nationwide. Furthermore, one in four Black children with disabilities are suspended in contrast to their White counterparts where only one in eleven are suspended. Skiba, Michael, Nardo, and Peterson (2002) report that, in addition to racial disproportionality in discipline, a gap also exists in gender. They found that boys were almost twice as likely to receive out of school suspension as girls. These findings present a great challenge to the field of education to not only reduce punitive response to problem behaviors, but also to address the serious issues of equity in discipline across demographic groups. In short, zero tolerance policies did not effectively address and reduce student problem behaviors in many of the nation’s public schools (American Psychological Association, 2008; Fabelo, Thompson, Plotkin, Carmichael, Marchbanks, & Booth, 2011; Gage, Sugai, Lunde, and DeLoreto, 2013; Martinez, 2009; NASP 2001).

Positive Behavioral Interventions and Supports. Evidence showed neither corporal punishment nor zero tolerance policies were effective in changing student behavior, which further resulted in disproportionate and negative student outcomes. Researchers, policy makers, and educators were searching for strategies that would effectively address student behavior.

NASP identified three effective and promising alternatives to zero tolerance and suspension/expulsion policies and practices: violence prevention initiatives, social skills training and positive behavioral supports, and early intervention strategies (NASP, 2001). Additionally, the Individuals with Disabilities Education Act (IDEA) of 1990 (an amendment of the Education of Handicapped Children Act of 1975) began addressing specific behavior disorders and requirements for supporting identified students. The first reauthorization of IDEA (1997) not only recognized specific behavioral disorders, but it also addressed the need for more effective behavioral interventions for students with behavioral disorders and for students with disabilities whose behavior was a manifestation of their disability. Under the first reauthorization of IDEA (1997), schools were given increased flexibility in addressing behavioral issues with students with disabilities. First, schools were given the ability to discipline students with disabilities in the same way that they addressed problem behaviors for students without disabilities (with a few restrictions). Restrictions on this flexibility center around suspension and removal of students with disabilities from the educational environment. Special education students could be suspended for up to ten days without services and without a review of their Individualized Education Plan (IEP). Students with disabilities could be moved to an interim alternative education setting (IAES) for up to forty-five days if the student brought a weapon or drugs to a school or a school function. A hearing can also be held to remove the student from the educational setting if the student is deemed a threat to other students. Additionally, IDEA (1997) requires that a student with disabilities whose behavior is a manifestation of their identified disability be placed on a behavior intervention plan (BIP). This plan is to be proactive and include positive intervention strategies. If there is a behavioral issue that arises with the student in which the school wishes to seek alternative placement or desires to impose a suspension longer than ten days, a manifestation determination is required. This is a process that requires the student's IEP team to determine if the behavioral concern is related to their identified disability. Finally, the first reauthorization of IDEA (1997) introduced PBIS to the law and brought the establishment of the National Center on PBIS in an effort to scale up supports for districts and schools around the implementation of evidence-based practices for addressing student behavior (Sugai & Simonsen, 2012). As a part of the work of the PBIS National Technical Assistance Center, Sugai and Simonsen (2012) discuss the purpose of the PBIS framework in the following way:

> PBIS is an implementation framework that is designed to enhance academic and social behavior outcomes for all students by (a) emphasizing the use of data for informing decisions about the selection, implementation, and progress monitoring of evidence-based behavioral practices; and (b) organizing resources and systems to improve durable implementation fidelity (p.1).

The establishment of these supports led to a national shift in addressing behavior in a preventative and proactive manner in districts and schools for all students, not just those students who were identified with behavioral disorders. New research and syntheses of past research were led by Sugai and Horner (2002) to determine the need for and effectiveness of a proactive, positive shift in responses to student problem behaviors, such as PBIS. They found four factors to be consistent in research: a) punishment and exclusionary practices are not effective in the absence of proactive systems to support students; b) there are behavioral principles that support effective systems for responding to students with behavioral disorders; c) effective instruction can lead to a decrease in student problem behaviors; and d) school-wide behavioral support systems can effectively reduce the amount of student problem behaviors, both anti-social and disruptive (Sugai & Horner, 2002). This school-wide system is a PBIS framework that is meant to address and support student behaviors in a positive and proactive manner rather than a reactive manner. Moving from the concept of positive behavioral support for individuals with behavioral challenges to a systems approach of PBIS requires that districts and schools look to organizational structures to support all students. Figure 2.1 is a visual depiction of the four critical elements of PBIS being supported by effective practices as presented by Sugai and Horner (2002, P. 30). The four critical elements are systems, practices, data, and outcomes. These elements are supported by the use of four effective practices: "social competence and academic achievement; supporting staff behavior; supporting decision making; and supporting student behavior" (Sugai & Horner, 2002, p. 30).

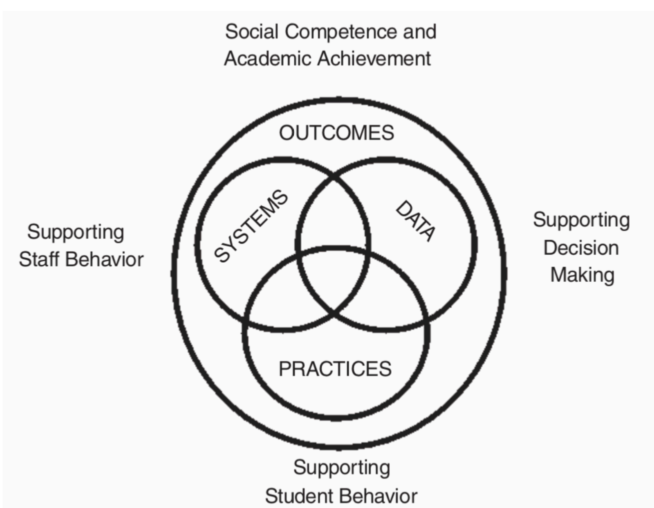


Figure 2.1: Four Elements of School-Wide Positive Behavior Support (Sugai & Horner, 2002, p. 30)

With research pointing to the use of PBIS as an effective and efficient way of addressing student behaviors in districts and schools and as a replacement for systems focused on punitive reactions, the second reauthorization of the Individuals with Disabilities Education Act of 2004 explicitly wrote PBIS in as a way to support students with disabilities whose behaviors are manifestations of their identified disability or disabilities. Multiple researchers have validated the findings and claims of Sugai and Horner (2002) and have used their research findings to expand upon the literature around PBIS in the field.

Other options for addressing behavior, such as Conscious Discipline (McDaniel, 2008), Restorative Practices (Gregory, Clawson, Davis, & Gerewitz, 2016), and Love and Logic (Fay & Fay, 2000), are available to schools. However, PBIS has been chosen by 25,911 schools for a number of reasons (OSEP, 2018). One of the many strengths of PBIS is that it is a framework, not a prepackaged program, thus making it easier to contextualize the framework in individual schools and districts while maintaining the critical features that make PBIS effective (Freeman et al., 2015). PBIS emphasizes prevention rather than solely focusing on the response after problem behaviors occur, as can be the case in other approaches (Bradshaw, Mitchell, & Leaf, 2010). In addition, PBIS has well defined components that are easily assessed in practice through established fidelity measures such as the School-wide PBIS Tiered Fidelity Inventory (Algonzzine et al., 2014).

Thematic Review

With 25,911 schools implementing PBIS across the United States as of November of 2018, research has found PBIS to be an educational framework producing promising results (OSEP, 2018). Many researchers have focused on the common elements that support sustainable implementation of a PBIS framework. This work has found concurrently common elements supporting and hindering implementation. Districts and schools are looking for ways to approach student behaviors that allow them to support successful outcomes effectively and efficiently. It is crucial to understand the critical features necessary for implementation fidelity and sustainability which support PBIS in being implemented and sustained over time.

Common elements for implementation of PBIS. Multiple studies have been conducted around critical features that support PBIS implementation. Coffee and Horner (2012) identified critical features of PBIS implementation: a contextually appropriate innovation; staff buy-in; a shared vision; administrative support; ongoing technical assistance; data-based decision-making and sharing; and continuous regeneration. Additionally, they found that two areas were most likely to support sustained implementation fidelity: a supportive administrator who communicates with stakeholders around core concepts of PBIS and data which are collected and used to support decision-making. This research aligns with research conducted by Klingner, Boardman, and McMaster (2013). These researchers found support from leadership was a key driver to not only the adoption of evidence-based practices within a PBIS framework, but it was also a critical element in the sustainability of high levels of implementation. Sugai and Horner (2006) share similar findings that are consistent across districts with sustained implementation of the critical features of PBIS: effective leadership teams; allocation of resources to support implementation; stakeholder support; effective training, coaching, and technical assistance for implementers; and on-going evaluation. These features were also echoed in research conducted by Pinkelman, McIntosh, Rasplica, Berg, and Strickland-Cohen (2015), who identified staff buy-in as a major component of effective implementation. Mathews, McIntosh, Frank, and May

(2014) concur with these findings adding implementer skill and the effective and consistent use of data as additional critical features for sustainable implementation fidelity. Using implementation science as a lens to categorize these findings, the drivers of implementation are leadership, organizational systems, and capacity (Ogden & Fixsen, 2014). All of the research around PBIS' critical features falls into the categories of leadership, organizational systems, and capacity.

School districts and schools must pay close attention to the evaluation of PBIS in order to ensure that high levels of implementation fidelity are occurring during implementation. Without implementation fidelity, districts and schools cannot expect to realize the outcomes they desire. A recent, comprehensive fidelity measure of PBIS is called the School-Wide Positive Behavioral Interventions and Supports Tiered Fidelity Inventory (SWPBIS TFI). The SWPBIS TFI was developed to provide the field with a valid, reliable, and efficient measure to assess to what degree a school has put the core features of PBIS in place (Algozzine et al., 2014). Not only does the SWPBIS TFI measure the extent of PBIS implementation fidelity, it was also developed and validated as an effective and efficient measurement of fidelity across all three tiers of the PBIS framework. This tool is particularly useful for educational leaders as it is a free access tool which can be used to guide planning of PBIS implementation, to progress-monitor improvement of fidelity, and to assess formatively the implementation of tiers (Massar, McIntosh, Mercer, & Hoselton, In Press). The SWPBIS TFI was specifically developed to measure implementation fidelity of the critical features of PBIS as identified by researchers in the aforementioned studies. The SWPBIS TFI specifically identifies three critical areas for Tier 1 PBIS implementation fidelity: teams, implementation, and evaluation. Additionally, the SWPBIS TFI states that a school is considered implementing Tier 1 with fidelity when it reaches a score of 70% (Algozzine et al., 2014). This criterion was established based upon a study conducted by Mercer, McIntosh, and Hoselton (2017), wherein the authors found statistically significant results when schools reached a 70% threshold of implementation fidelity on the SWPBIS TFI (K. McIntosh, personal communication, March 27, 2018). This study examined the outcomes of implementation fidelity of the critical features of PBIS, and it cross analyzed multiple fidelity assessments in order to establish the 70% fidelity criterion. The researchers identify a need to continue examining the foundations of this criterion to confirm the established threshold of 70% and to generalize these findings in other regions (Mercer, McIntosh, & Hoselton, 2017).

Outcomes of implementation fidelity. In 2015, Horner and Sugai reported 21,000 schools over a timespan of twenty years had implemented PBIS. With 25,911 schools implementing PBIS today (OSEP, 2018), multiple researchers have conducted studies around the outcomes that can be expected when districts and schools implement the critical features that support PBIS with fidelity given the amount of time and widespread sample of schools to examine. In the following sections, research around these outcomes will be presented including decreased problem behaviors and exclusionary consequences (suspensions and expulsions), increased student attendance, and increased academic achievement.

Decreased in problem behaviors and exclusionary consequences. One of the most common outcomes of implementing PBIS with fidelity is whether schools see a significant reduction in student problem behaviors. For example, Freeman, Simonsen, McCoach, Sugai, Lombardi, and Horner (2015) reported a statistically significant decrease in office discipline referrals (ODRs) for schools which were at or were approaching implementation fidelity of

PBIS. This finding reveals that not only will schools who reach implementation fidelity of the critical features of PBIS realize outcomes, but even those schools who are approaching fidelity will see a decrease in student problem behaviors. Similar results were found in a research study conducted by Bradshaw, Mitchell, and Leaf (2010). This study was a randomized, controlled effectiveness trial spanning five years and involving thirty-seven elementary schools. The findings of this study revealed that an increase in PBIS implementation led to a significant decrease in major and minor office discipline referrals from the beginning to the end of the trial. A study conducted in 1,122 schools in Florida found that there is a decreasing trend in average student discipline referrals per 100 students in schools implementing PBIS as compared to schools not implementing PBIS (Childs, Kincaid, Peshak George, & Gage, 2015). Furthermore, the researchers found a greater decrease in discipline referrals for schools implementing PBIS with higher levels of fidelity than those implementing PBIS with lower levels of fidelity. There have been numerous studies conducted in single buildings, districts, or regions that have found similar results involved in a statewide scale-up of PBIS. For example, research conducted by Sherrod, Getch, and Ziomek-Daigle (2009) revealed a 26% decrease in the total number of office discipline referrals (ODRs) in one elementary school after one year of PBIS implementation. Similarly, Muscott, Mann, and LeBrun (2008) conducted a study of 22 schools in New Hampshire and found a 28% reduction in total reported ODRs after one year of implementation. However, some research has revealed that a reduction in ODRs is not always directly reflected during initial years or stages of implementation. In fact, this research has shown that some ODR rates increase as staff become more accurate in their data collection and reporting (Childs et al, 2015; Gage et al., 2018). While much research has been conducted at the elementary level, Muscott, Mann, and LeBrun looked at elementary, middle, and high school settings. Their study found that PBIS had an impact in all settings; however, the largest benefit was realized at the middle and high school settings. This finding is significant to the field due to a common misconception that PBIS is for elementary schools. Multiple research studies confirm the finding that implementation with fidelity of the core features of PBIS is followed by a reduction in student office discipline referrals (Benner, Nelson, Sanders, & Ralston, 2012; Horner, Sugai, Smolkowski, Eber, Nakasato, Todd, & Esperanza, 2009; Rusby, Crowley, Sprague, & Biglan, 2011; Sprague, Walker, Golly, White, Myers, & Shannon, 2002). Concurrently, there is also research to suggest that ODRs might not be the most reliable measure of PBIS implementation as schools and districts become more accurate in their data collection and reporting (Childs et al., 2015; Gage et al., 2018).

As student problem behaviors decline, research has also shown a decrease in exclusionary discipline practices, such as suspensions and expulsions. In one school where PBIS core features were implemented with fidelity, Fitzgerald, Geraci, and Swanson (2014) found a 73% decrease in detentions, 36% decrease in in-school suspensions, and a 50% decrease in out-of-school suspensions. This means that students in this setting were in school and in class more often, naturally leading to more academic learning time and less time being excluded from normal district and school activities. Scott (2001) found that a decrease in suspensions due to the implementation of the critical features of PBIS led to an increase in instruction time of more than 775 classroom hours. The results showed that students were included rather than excluded in educational environments over 775 hours more than they were prior to the introduction of a PBIS framework. In another study conducted by Scott and Barrett (2004), there was a gain of 27.7

days of instruction during the first year of implementation and a gain of 31.2 days of instruction during the second year of implementation. Finally, Greflund, McIntosh, Mercer, and May (2014) report that one study in a middle school showed a decrease in suspensions of over 75% due to the implementation of the critical features of PBIS. Both in-school and out-of-school suspensions decreased at significant rates in these studies due to the decrease in student problem behaviors and the implementation of a positive, proactive system of supports.

Studies have also found that the implementation of the critical features of PBIS with fidelity in non-traditional settings impacts students' social outcomes in addition to the outcomes realized in traditional school systems. Johnson et al. (2013) conducted a study around the implementation of the critical features of PBIS in a juvenile corrections facility. As a result of implementation, there was a 46% reduction in overall discipline incidents, including a decrease of 41% of incidents without security involvement and a decrease of 56% of incidents with security involvement (Johnson et al., 2013). Lampron and Gonsoulin (2013) also conducted a thorough review and syntheses of literature around the effects of youth who were placed in restrictive settings such as juvenile detention facilities and residential treatment centers. Their review found that facilities implementing proactive, positive behavioral supports were able to offer youth new opportunities to learn and grow. Some of these experiences were as simple as hearing positive messages about themselves or their actions. Some of the experiences were more complex such as receiving treatment that focused on building healthy relationships and developing self-management skills (Lampron & Gonsoulin, 2013).

Much of the available research focuses on behavioral outcomes at specific levels of the educational system, both traditional and non-traditional. Studies conducted by Bradshaw, Koth, Thornton, and Leaf (2009) and Bradshaw et al. (2010) examined the effectiveness of PBIS implementation within schools and across cohorts. Findings of both studies revealed positive results around a reduction in student problem behaviors. These studies also examined outcomes across schools to identify variability based upon factors such as years or levels of implementation. Similar studies reported comparable findings (Bradshaw, Pas, Debnam, & Lindstrom Johnson, 2015; Bradshaw, Waasdorp, & Leaf, 2015; Childs et al., 2015; Freeman et al., 2015; Horner et al., 2009; Muscott et al., 2008). However, these studies did not examine the effectiveness of PBIS across the school demographic groups of city, suburb, town, and rural. While some focused in on disproportionality and equity of specific subgroups or disenfranchised populations within schools, these studies did not examine whether the effects of PBIS on behavioral outcomes that have been reported in their studies were consistent across groups of schools based on demographics. This gap in the research makes it difficult for educational leaders to promote and garner staff buy-in around PBIS within their specific context. While educators are eager to put in place effective frameworks for responding to and proactively addressing student behaviors, many desire to see that PBIS will produce successful outcomes in their locale (city, rural area, etc.). Research to determine if there is generalizability of positive student outcomes between groups of schools based on locale is missing from the current literature.

Increased student attendance. Since the mission of adopting a PBIS system is to improve behavioral and social outcomes for students, researchers have studied the effects of implementation on student attendance rates. Research done at the secondary level by Freeman et al. (2015) reported a statistically significant association between high levels of implementation fidelity around the critical features of PBIS and student attendance. Their research reported schools who were approaching or at implementation fidelity had higher levels of student attendance over time. While this study did review data by groups of schools, the groupings were based upon their level of implementation fidelity rather than on their locale groupings. Fitzgerald, Geraci, and Swanson (2014) found in one school that the implementation of PBIS-based initiatives led to a 37% decrease in absences, a 77% decrease in excused class tardies, and a 56% decrease in unexcused class tardies. These studies demonstrate how the implementation of PBIS critical features affects student attendance. In addition to traditional public schools seeing an increase in attendance rates, non-traditional settings are reporting similar outcomes. In a study conducted in a Texas male juvenile correction facility, Johnson et al. (2013) found a 21% increase in average daily attendance as a result of PBIS implementation. Additional research is needed to determine if these findings are generalizable across school locale groups.

Increased academic achievement. With research showing an increase in student attendance, there is also an increase in opportunities for students to be academically engaged in school. Some of the more promising studies have identified an association between a decrease in student behavior problems and an increase in academic opportunities. As examples, a study by Najaka, Gottfredson, and Wilson (2002) showed that by simply focusing on supporting positive behaviors, there was an increase in the likelihood of students engaging positively with academic content. In a quasi-experimental study, Luiselli, Putnam, Handler, and Feinberg (2005) found that positive behavior supports were associated with a reduction in problem behaviors and an increase in academic achievement. While the researchers admit they cannot state that the increase in academic achievement is unequivocally related to the decrease in student problem behaviors, they found the association to be strong.

Similarly, a study conducted by Muscott, Mann, and LeBrun (2008) found that as PBIS implementation increased, not only did problem behaviors decrease, but academic performance increased as well. The researchers discussed how teachers observed the connection between a decrease in problem behaviors resulted in an increase in students being in class and present for instruction. The researchers calculated that with an average of twenty minutes spent on each referral, the school gained back a net average of 10,620 instructional minutes over a two-year period. This is equivalent to 29.5 days of school. They also found an additional fifty days of instruction was gained due to a decrease in student suspensions. For most schools in the study that maintained an 80% level of implementation fidelity, there was an increase in math and reading achievement on state standardized tests for elementary, middle, multi-grade, and high school levels.

Yet another finding related to the association between academics and PBIS was examined by Horner et al. (2009). They found preliminary results indicating that implementation with fidelity of the critical features of PBIS interacts with effective instruction to improve academic outcomes. Finally, one of the most cited studies regarding the link between PBIS and academic achievement was done by Bradshaw, Mitchell, and Leaf (2010). In this study, the researchers found that schools where training had occurred to support high levels of implementation fidelity of the critical features of PBIS tended to outpace schools where PBIS training had not occurred on state standardized tests. While the researchers report that none of the results were statistically significant, the positive association between PBIS and student academic outcomes was strong, providing social validity of the impact of implementation on student outcomes. Again, the research around the connection between PBIS and academic improvements has been primarily focused at the school level, looking for effects regardless of the school's locale. Additional research in this area is needed not only to confirm that academic achievement will improve with implementation fidelity of the core features of PBIS, but it is also needed to demonstrate that these outcomes are generalizable across the school locale groups of city, suburb, town, and rural.

In addition to traditional public schools seeing an increase in academic achievement, non-traditional settings are also reporting increased academic outcomes for their students. Johnson et al. (2013) reported their program, comprised of students in a male juvenile correction facility in Texas, saw an increase of 131 earned industry certifications. While research related to academic increases due to high levels of implementation fidelity of the critical features of PBIS is preliminary in many cases, the research presented here points to a direct association between a decrease in student problem behaviors and an increase in academic gains in both traditional and non-traditional school settings.

Disproportionality and equity. An emerging topic of study around the implementation of the critical features of PBIS is around equity and disproportionality. Disproportionality is defined as the ratio between the percentage of people in a specific racial or ethnic group being negatively over-identified in comparison to their percentage of the overall population (McRoy, Fong, & Dettlaff, 2014). Studies have shown that minority students, particularly African American students, are excluded from school and school related activities due to behavioral problems at a much higher frequency than Caucasian students, causing them to be disproportionately identified for these behavioral consequences (Fenning & Rose, 2007; Girvan, Gion, McIntosh, & Smolkowski, 2017; Skiba et al., 2002). One study showed that while the incidents of office discipline referrals (ODR) between subgroups was not statistically significant, there was a large variance in consequences tied to those ODRs. The aboriginal status of students was a statistically significant predictor for students receiving other or unknown administrative punishments when compared to other students with a *p* value or significance level of 0.01. This finding suggests a cultural bias in disciplinary procedures of the school (Greflund, McIntosh, Mercer, & May, 2014). Another study conducted in 1,666 elementary schools showed a similar pattern. Smolkowski, Girvan, McIntosh, Nese, and Horner (2016) found that there was an increased level of disproportionality in regard to race and gender for subjectively defined behaviors, in classrooms, and for events that were deemed more severe in nature. They specifically found a 7.2:1 odds of subjective ODRs being submitted in the system, and of those ODRs, African American students were 1.2 times more likely to receive a subjective ODR as opposed to an objective ODR. These results were analyzed further to reveal that African American females were 1.49 times more likely to receive a subjective ODR than Caucasian females (Smolkowski, Girvan, McIntosh, Nese, & Horner, 2016).

In yet another study, Bal, Kozleski, Schrader, Rodriguez, and Pelton (2014) found that the bureaucratic nature of the district and school systems was a significant player in the presence of disproportionality in student discipline. Their findings revealed that the historical and social context of the community affected outcomes. These effects were brought into the system not only by adults, but by students as well. Through interviews and observations in a learning lab environment, the researchers concluded that the impact of the PBIS model that had been implemented in the school showed promise of addressing some of the longstanding issues related to race and disproportionality by simply causing stakeholders to look at data and address the issues collectively (Bal et al., 2014). With disproportionality and equity issues around student discipline being prevalent in districts and schools, educational leaders are looking for ways to address the issues that fit their local context. Additional research around the generalizability of PBIS outcomes across locale groups or schools would help to determine if PBIS could address issues of equity and disproportionality regardless of locale.

Addressing issues of disproportionality and equity in school discipline is an emerging area of research that continues to expand. McIntosh, Girvan, Horner, Smolkowski, and Sugai (2014) published a paper through the Office of Special Education Programs Technical Assistance center providing guidance for schools and districts regarding how to address disproportionality in school discipline. The first recommendation is to use effective instruction to reduce the achievement gap between minority students and White students. The authors note that effective instruction includes “(a) explicit instruction, (b) high rates of opportunities to respond with performance feedback, and (c) use of formative assessment to guide instruction” (McIntosh et al., 2014, p. 2). The second recommendation given is to implement PBIS in order to build a foundation of prevention. The authors assert that the implementation of the critical features of PBIS prevents problem behaviors from occurring and establishes a system that is built upon positive recognition and acknowledgement of appropriate behaviors rather than a reliance upon punishment, which can often be inconsistent. The third recommendation is to collect, use, and report disaggregated student discipline data. The authors recommend the use of the School-Wide Information System (SWIS) as a tool to support schools in meeting this recommendation. They also cite the use of specific reports that support the identification of possible disproportionality, which assist schools in becoming aware and addressing these issues as they arise. The fourth recommendation is for schools and districts to develop policies with accountability around discipline equity. The authors recommend that schools and districts include equity language in hiring procedures, evaluation procedures, data collection protocols, and professional development. The fifth and final recommendation is to teach neutralizing routines for vulnerable decision points. This means that districts and schools need to provide professional learning for all staff around which situations may be prone to bias and support staff in identifying and addressing them.

Another area of research that addresses equity and disproportionality in discipline is culturally responsive PBIS practices. Vincent, Randall, Cartledge, Tobin, and Swain-Bradway (2011) describe a culturally responsive approach to addressing disproportionality through a PBIS framework. The researchers propose an expansion of the key features of PBIS (practices, data, systems, and outcomes) to allow for a culturally responsive system that supports the elimination of disproportionality and bias in discipline. The additional features are: “(a) systematically promoting staff members’ cultural knowledge and self-awareness, (b) commitment to culturally relevant and validating student support practice, and (c) culturally valid decision making to enhance culturally equitable student outcomes” (Vincent, Randall, Cartledge, Tobin, & Swain-Bradway, 2011). The authors report that the theoretical framework of cultural responsiveness closely aligns with the key features and theoretical framework of PBIS. They found that the additional features mentioned above allows for PBIS to address explicitly bias and equity in relation to student discipline. They state, “given that [school-wide PBIS] is conceptually focused on changing the environment, its key features could provide the tools to build those bridges [school culture, student and family culture, and community culture]" (Vincent, Randall, Cartledge, Tobin, & Swain-Bradway, 2011).

Similar research conducted by Cramer and Bennett (2015) identifies steps to be taken in support of cultural responsiveness within a PBIS framework. The first step described by the researchers is to have teachers look at themselves to identify their bias. The researchers recommend the use of perception surveys as well as self-assessments to facilitate this process. The second step is for educators to begin collecting data on their own interactions with students to identify patterns in their actions that could be contributing to disproportionality in student discipline. The next step is for intentional home-school collaborations. The researchers suggest that the school should know the family, and the family should know the school. The final step is to analyze the systems of the school that support learning: curriculum, instruction, and classroom management. These systems tend to be culturally biased, thus creating the opportunity for disproportionality in all areas. Through the implementation of these steps, the researchers state that, "teachers can incorporate culturally responsive practices into the overall design and management of their classes, thereby potentially extending the benefits of PBIS" (Cramer & Bennett, 2015).

Methodological Review

Research conducted around the effects of PBIS implementation has primarily been done using a quantitative method, with few studies utilizing qualitative or mixed methods approaches (e.g. Bal et. Al, 2014). In order to assess the effectiveness of PBIS implementation on achieving desired outcomes, it is critical for researchers to choose methodologies which allow them to analyze the strength of predictor variable(s) on criterion variable(s).

Mercer, McIntosh, Strickland-Cohen, and Horner (2014) used a research-based evaluation tool, namely the *School-Wide Universal Behavior Sustainability Index: School Teams* (SUBSIST), developed and vetted by the PBIS Technical Assistance Center to conduct program evaluation of PBIS sustainability. They conducted a study of psychometric properties. The measures were analyzed to reveal if there was variance across the sample set. Through the use of a correlation design, namely the confirmatory factor analysis (CFA), they were able to investigate and report accurately on the level of measurement variance between schools in initial implementation, those which had institutionalized implementation, and those which had sustained implementation over time. The correlational design of this study allowed the researchers to answer their questions around the likelihood of sustained implementation overtime. Additionally, in an effort to analyze the predictive validity of PBIS implementation and school climate on student mental health outcomes, Salle, George, Betsy, Polk, and Evanovich (2018) used a correlational study to examine their study's data. More specifically, they used a multiple regression analysis to determine the extent or magnitude of the predictive validity of multiple predictor variables on student mental health outcomes. This design allowed the researchers to not only determine the predictive validity of variables, but it also allowed them to determine the strength of each predictor variable on the criterion variable. Similarly, in an effort to analyze PBIS implementation in a specific state, Bradshaw and Pas (2011) also utilized a correlational study method to conduct analysis of their findings. By analyzing implementation of districts across the state of Maryland, these researchers were able to determine factors contributing to and hindering implementation of PBIS. Numerous other correlational studies have been conducted around the effects of PBIS on behavior and student mental health (Benner, Nelson, Sanders, & Ralston, 2012; Bradshaw, Pas, Debnam, & Lindstrom Johnson, 2015; Childs, Kincaid, Peshak George, & Gage, 2015; Freeman, Simonsen, McCoach, Sugai, Lombardi, & Horner, 2015; Greflund, McIntosh, Mercer, & May, 2014; Horner, Sugai, Smolkowski, Eber, Nakasato, Todd, & Esperanza, 2009; Rusby, Crowley, Sprague, & Biglan, 2011). In addition to looking at the effects of PBIS on behavior and mental health, correlational studies have also been conducted to analyze the effects of PBIS on other factors such as attendance and academic outcomes (Bruhn, Barron, Fernando, & Balint-Langel, 2018; Freeman et al., 2015; Horner et al., 2009).

The review of research clearly points to a quantitative analysis of a correlational design as being the most effective method of reviewing PBIS implementation data to determine the association between variables. With the literature review's repeated findings that are desired within this research proposal being that of a predictive association between variables, the best design for this study was to conduct a predictive correlational analysis.

Chapter Summary

This literature review provided an overview of the history, themes, and outcomes related to implementation fidelity of the critical features of PBIS. Through a thorough review of literature, this chapter helped the reader understand the context leading to PBIS as a fundamental framework to support students, the outcomes that can be expected when PBIS is implemented with fidelity, and the gaps in research leading to the purpose of this study. The research that has been presented and reviewed clearly outlines the shift in discipline practices in districts and schools toward a more proactive and positive system of supports. There are clear indicators that the use of a PBIS framework to address student needs on a tiered continuum is effective at reducing problem behaviors, increasing student attendance, and contributing to increased academic achievement. While the research that has been conducted includes effectiveness around PBIS evaluation tools, there is a need for additional studies around the association and predictive validity of implementation fidelity and stages of implementation that must be reached in order for schools to realize intended outcomes including a decrease in student problem behaviors. There is also a need for research around the generalizability of expected outcomes across the school groups of city, suburb, town, and rural.

CHAPTER THREE

METHODOLOGY

This chapter details the study's correlational research design and methodology with the goal of determining if Positive Behavioral Interventions and Supports (PBIS) implementation has a statistically significant association with the rate of student problem behaviors. Student problem behaviors were measured using office discipline referrals (ODRs). Additionally, this study aimed to analyze data around the stage of implementation of PBIS to discover if particular stages have more predictive validity on reducing student problem behaviors. Finally, this study desired to analyze external generalizability of PBIS outcomes across schools grouped by the locales of city, suburb, town, and rural. Against the backdrop of this study's intended purpose, this chapter was divided into seven distinct sections: problem statement and research questions; hypotheses; research design; research techniques; data collection sources and techniques; data analysis techniques; and research ethics. Detailed information around the tools used and data analyzed were included in this chapter.

Problem Statement and Research Questions

Like many other states across the nation, Michigan has funded efforts to support schools in implementing PBIS (Dunlap, Goodman, McEvoy, & Paris, 2010). In support of PBIS implementation at the local and regional level, Michigan's Department of Education chose to invest both state and federal funding into Michigan's Integrated Behavior and Learning Support Initiative (MIBLSI) for over a decade. MIBLSI is an Individuals with Disabilities Education Act (IDEA) grant funded initiative through the Michigan Department of Education's Office of Special Education (MIBLSI, n.d.). While MIBLIS has multiple streams of funding supporting their work in Michigan, a majority of their funding is IDEA related. This initiative supports local education agencies, both intermediate school districts and local school districts, in implementing multi-tiered systems of support for reading and behavior. Districts and schools across the state of Michigan are interested in finding an effective and efficient manner to address the multiple needs of all students by supporting their social, emotional, and behavioral development in a systematic way. PBIS offers district and school leaders a multi-tiered behavioral supports model to promote students' social, emotional, and behavioral competencies. Through the work of the MIBLSI project, schools and districts have been utilizing a fidelity measure that was recently developed to assess PBIS implementation. This tool is the School-Wide PBIS Tiered Fidelity Inventory (TFI), and it measures the level to which PBIS is being implemented with fidelity at the school system level. Fidelity of implementation is defined as the degree to which a program, intervention, or practice is put into place as it was originally designed (Lane & Beebe-Frankenberger, 2004). With the use of TFI data across the School Climate Transformation Grant (SCTG) participating schools, MIBLSI is able to show the impact that their supports have on the level of implementation of PBIS in schools and districts. Partnering schools are also able to utilize this data to monitor the progress of their system of supports for students and to make timely decisions around systems level interventions that might be needed. In addition, all schools working with MIBLSI are using the School-Wide Information System (SWIS) database to track student outcome data in the form of ODRs. Since PBIS is a crucial area of focus for districts and schools looking to support the non-academic needs of students, it is imperative that the effects of PBIS implementation, specifically the effects of data-based decision making, are analyzed to inform educational leaders about the benefits these efforts will have on student outcomes.

Leaders are able to analyze these data to make decisions around school-wide, group, and individual student supports needed.

PBIS is a commonly implemented educational framework in schools with over 25,000 currently implementing (OSEP, 2018). PBIS is often found in literature and legislation around general and special education as it is a system to support all students. While the research conducted around PBIS includes effectiveness of PBIS at decreasing problem behaviors, there is a need for additional studies around the association between the threshold of fidelity and a decrease in student problem behaviors. Given that implementation occurs in stages, there is a need for studies addressing the predictive validity of implementation fidelity and stage of implementation on the rate of student problem behaviors. There is also a need for research around the generalizability of expected outcomes across schools grouped by locale (city, suburb, town, and rural), as this information will support educators in each of these locales to justify supporting PBIS overtime. In an effort to provide local superintendents in the state of Michigan with a compelling reason to continue supporting PBIS after local, state, and federal grants have ended, a quantitative analysis employing a correlational design was conducted to determine the predictive validity of Tier 1 PBIS implementation fidelity to student outcomes. Analysis was conducted based on stage of implementation as well as fidelity assessment scores to demonstrate the effectiveness of PBIS at supporting schools in decreasing student problem behaviors. With the need to further support research around the effectiveness of PBIS at addressing student behaviors, the following research questions were considered in this study:

1. ***Is there a statistically significant association between School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score and the rate of student problem behaviors as measured by office discipline referrals reported in SWIS?***

2. ***What is the predictive validity of School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score and Tier 1 PBIS stage of implementation on the rate of student problem behaviors as measured by office discipline referrals reported in SWIS?***

3. ***Given a positive finding in question one, is there external generalizability across demographic locales (city, suburb, town, and rural) after controlling for stage of implementation when Tier 1 of PBIS is implemented with fidelity as measured by the School-Wide PBIS Tiered Fidelity Inventory?***

Hypotheses

Null hypotheses.

Research question 1. There is not a statistically significant association between School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score and student problem behaviors as measured by ODRs reported in SWIS.

Research question 2. There is no predictive validity of School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score or Tier 1 PBIS stage of implementation on the rate of student problem behaviors as measured by ODRs reported in SWIS.

Research question 3. There is no generalizability of positive outcomes across demographic locales (city, suburb, town, and rural) after controlling for stage of implementation when Tier 1 of PBIS is implemented with fidelity as measured by the School-Wide PBIS Tiered Fidelity Inventory.

Alternate hypotheses.

Research question 1. There is a statistically significant association between School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score and student problem behaviors as measured by ODRs reported in SWIS.

Research question 2. There is predictive validity of School-Wide PBIS Tiered Fidelity Inventory Tier 1 percentage score and Tier 1 PBIS stage of implementation on the rate of student problem behaviors as measured by ODRs reported in SWIS.

Research question 3. There is generalizability of positive outcomes across demographic locales (city, suburb, town, and rural) after controlling for stage of implementation when Tier 1 of PBIS is implemented with fidelity as measured by the School-Wide PBIS Tiered Fidelity Inventory.

Research Design

When analyzing the association between variables, the most appropriate statistical design is a correlational study. Correlational research design involves the analysis of the association between variables with little or no researcher control over the variables. There are two types of correlational research designs: predictive and explanatory. Predictive studies allow researchers to estimate the degree to which the independent variable (or each independent variable among a set of predictors) is able to predict the dependent or criterion variable. This means that a predictive study allows a researcher to discover the value of a dependent variable based upon the value of an independent variable. Explanatory studies allow researchers to analyze the association or relationship between variables. These studies allow researchers to analyze the effects one variable has on another. Some statisticians even defend that explanatory research tests causal theories. While there is not a direct cause-effect relationship that is made from an explanatory study, researchers conclude that explanatory studies are used to determine the strength and direction of the association of two variables. Whereas some early researchers stated that explanatory and predictive research were synonymous, distinctions between these models became apparent overtime (Dubin, 1969; Helmer & Rescher, 1959; Hemple & Oppenheim, 1948). When specifically looking at correlations around causation-association, researchers have found that explanatory models demonstrate an association between variables, while predictive models can foreshadow and underlying causal function between predictor and criterion variables (Beaudry & Miller, 2016; Dubin, 1969; Helmer & Rescher, 1959; Hemple & Oppenheim, 1948; Muijs, 2011; Salkind, 2016; Tuckman & Harper, 2012). The design of this study was a progression of analyses with the intention of being a predictive study. However, statistical tests demonstrated that the data set violated the assumptions of normality. The first statistical test conducted was for linearity. This test analyzes the relationship between variables to see if they have a linear relationship. The second statistical test conducted was for homoscedasticity. This test analyzes the dispersion of data points on a scatter plot. To have homoscedasticity, the variables would need to be normally distributed along a line and not gathered around a certain point or appear unevenly dispersed. Given that the multiple regression analyses were not able to be conducted due to a lack of linearity and homoscedasticity in the variables, this study became essentially an explanatory study.

The theoretical framework which guided this study was that as Tier 1 PBIS is implemented with fidelity, student problem behaviors decrease (Benner et al., 2012; Bradshaw et al., 2010; Childs et al., 2015; Freeman et al., 2015; Horner et al., 2009; Muscott et al., 2008;

Rusby et al., 2011; Sherrod et al., 2009; Sprague et al., 2002). These outcomes are the result of the implementation of evidence-based practices that have been proven to lead toward socially significant outcomes. The association between the two variables did not indicate causality; rather the correlation coefficient determined the strength of the association between Tier 1 PBIS implementation and student problem behaviors. Additionally, Fraenkel, Wallen, and Hyun (2015) identify six steps involved in conducting correlational research: problem selection, sample selection, instrument selection, research and procedure design, data collection, and data analysis and interpretation. There are many complexities associated with correlational research. One of the main concerns that a researcher should have with this type of research design is the presence of confounding variables. The researcher must be alert to the possibility of alternate explanations for the association between variables in order to control for threats to internal validity since correlational research establishes low measures of internal validity. As the presence of confounding factors is controlled, the study's validity is increased. In many cases, researchers may choose to conduct an experiment or conduct additional correlational studies to explain the magnitude, extent, or degree of variability of the independent variable(s) (Fraenkel et al., 2015).

This study's plan was to conduct the following analyses: descriptive statistical analyses, correlational analyses, predictive analyses through a multiple regression, and an analysis of generalizability through a simple analysis of variance (ANOVA). However, in order to conduct a predictive correlational study, the variables in the study needed to meet the assumptions of a predictive study. These assumptions were that the variables could pass statistical tests related to linearity, homoscedasticity, multicollinearity, outliers, and/or residual errors. This also required that the variables be orthogonal and parsimonious. While the TFI and ODR variables could pass the assumptions tests, the variable of stages of implementation could not. The stages of implementation variable was only included in the second research question. The second research question was the predictive analysis of this study, which means that the inability to conduct this analysis caused this study to shift from being a predictive study to an explanatory study.

Research Techniques

Descriptive statistical analyses. The study began with an analysis of the variables to become acquainted with the data set. ODRs were analyzed for the SCTG data set in comparison to the national summary data for ODRs. These analyses included sample size, mean, median, upper quartile, lower quartile, and standard deviation. In addition, TFI data were analyzed for the SCTG including sample size, mean, median, upper quartile, lower quartile, and standard deviation. While there was no national data set to compare to the TFI, the data were analyzed around the established threshold of fidelity (70%).

Research question one. To determine the association between Tier 1 PBIS implementation fidelity and decreased student behavioral outcomes, a quantitative analysis of a correlational design was conducted. Before conducting the correlational analyses, the data set was tested to see if it met the assumptions of normality (continuous data, linear relationship, no significant outliers, approximates a normal distribution). The unit of analysis for all data was at the school building level. According to Salkind (2016), a Pearson product-moment correlational study is conducted to determine the association (strength and direction) between two variables. Given that this study analyzed continuous quantitative variables, the Pearson correlation coefficient was used. According to Muijs (2011), correlational research using the Pearson correlation coefficient is grounded in the theory that researchers can determine the significance of an association between two continuous variables. Muijs clearly states that this association, no matter how significant, does not equate to causality. The Table 3.1 provides a sample representation of the 2017-2018 correlational study for five schools included in this study. (The study's full data set can be found in Appendix C.) In the first column, school buildings are listed. In the second column, SWPBIS TFI scores for Tier 1 percentages (variable O_1) are listed for each building. In the third column, student problem behaviors measured by the number of ODRs at the end of the year per 100 students, per day (variable O_2) are listed for each building.

Table 3.1: *Correlational Design Study Table*

School	TFI (O_1)	ODR (O_2)
1	87	0.61
2	87	0.18
3	77	0.75
4	93	0.68
5	93	0.41

Note: ODR = Office Discipline Referral, TFI = Tiered Fidelity Inventory

The output file from SPSS reported data for the Pearson correlation (revealing an *r* value describing direction and strength), significance level (revealing the *p* value or level of significance), and the *n* value (size of the sample). If the significance level (*p* value) was below 0.05, the data were noted with a double asterisk. Table 3.2 is an example of a correlation table that was generated by SPSS.

Table 3.2: SPSS Correlation Output File

		TFI	ODR
TFI	Pearson Correlation		
	Sig. (2-tailed)		
	N		
ODR	Pearson Correlation		
	Sig. (2-tailed)		
	N		

Note: ODR = Office Discipline Referral, TFI = Tiered Fidelity Inventory
** Correlation is significant at the 0.05 level (2-tailed)

Additionally, a scatterplot with a line of best fit was generated to provide a visual representation of the correlation. Since the TFI score was the independent variable, it was placed on the X axis of the graph. ODR data was the dependent variable and was placed on the Y axis. This display included the r^2 value. The r^2 value represents squaring the correlation coefficient to determine what percentage of the variance of the dependent variable can be explained by the independent variable (Salkind, 2016). Finally, a correlational matrix was created to compare data for both the 2016-2017 data and the 2017-2018 data.

Research question two. A multiple regression analysis was planned to determine the predictive validity of Tier 1 PBIS implementation fidelity and Tier 1 PBIS stage of implementation on the rate of student problem behaviors measured by ODRs. Salkind (2016) defines a multiple regression as an analysis of the predictive validity of two or more independent variables on a single criterion or dependent variable. The two independent variables for this analysis are the SWPBIS TFI Tier 1 percentage score and the stage of implementation as determined by the MIBLSI PBIS stage of implementation indicators (see Appendix E). The dependent variable in this analysis is ODR rate. The definition of this statistical procedure aligns to the second research question. The Tier 1 SWPBIS TFI score was coded as T_1. The stage of

Tier 1 PBIS implementation was coded as S_1. The stages are continuous and were identified as pre-exploration/adoption, exploration/adoption, installation, initial implementation, continuous regeneration, and elaboration. These stages are defined by MIBLSI for the SCTG participating schools in the following ways:

Table 3.3: Stages of Implementation

Stage	Definition
Pre-Exploration/Adoption	Increase awareness and access to information at the leadership level and with all staff. Develop common definitions of key terms and better understand the "why" for implementation. This is the default stage assignment for schools that do not meet the criteria for other stage.
Exploration/Adoption	Gathering information and communication regarding commitment to adopting the program/practices and supporting successful implementation through participation in Michigan's Promoting Positive School Climate Project.
Installation	Set up infrastructure so that successful implementation can take place and be supported. Establish team and data systems, collect data, develop plan.
Initial Implementation	Try out the practices, work out details, learn and improve before expanding to other tiers.
Elaboration	Expand the program/practices to other tiers in order to fully implement a multi-tiered behavioral framework, adjust from learning in initial implementation.
Continuous Regeneration	Make it easier and more efficient while maintaining positive outcomes. Embed within current practices.

Note: See Appendix E for the full MIBLSI stages of implementation indicators document.

This additional analysis would have provided information around the extent to which Y, or the criterion value (ODRs), could be predicted based upon T and S, or predictor values (Tier 1 SWPBIS PBIS TFI score and Tier 1 PBIS stage of implementation), allowing a determination to be made around which predictor variables are most predictive of the criterion variable. Prior to running the multiple regression analysis, the variables were assessed to ensure that they did not violate the assumptions of a multiple regression analysis. These tests included analyzing for linearity, homoscedasticity, multicollinearity, outliers, and/or residual errors. If these tests would have indicated that the multiple regression was appropriate, the equation for the multiple regression would have been:

$$Y' = b_0 + b_1T_1 + b_2S_1 + \varepsilon$$

Table 3.4 provides a sample representation of the multiple regression for five schools included in this study. (The study's full data set found in Appendix C.) In the first column, school buildings are listed. In the second column, Tier 1 PBIS stage of implementation (variable O_1) is listed for each building. In the third column, Tier 1 SWPBIS TFI percentage scores (variable O_2) are listed for each building. In the fourth column, the number of ODRs at the end of the year per 100 students, per day (variable O_3) are listed for each building.

Table 3.4: Multiple Regression Data Table

School Building	Stage of Implementation (O_1)	Tier 1 SWPBIS TFI Score (O_2)	End of Year ODRs/100 Students/Day (O_3)
1	Installation	87	0.61
2	Installation	87	0.18
3	Installation	77	0.75
4	Installation	93	0.68
5	Installation	93	0.41

Note: ODR = Office Discipline Referral, SWPBIS = School-Wide Positive Behavioral Interventions and Supports, TFI = Tiered Fidelity Inventory

An analysis of the significance of the predictor variables was planned to be conducted with the alpha level set to 0.05 (Salkind, 2016). Two tables were to be reported for the multiple regression output file: a) model summary and b) coefficients. The model summary was to provide the *r* value, r^2 value, adjusted r^2 value, and standard error of the estimate. The *r* value would have reported the strength of the linear association between the predictor variables and the criterion variable. The r^2 value is the coefficient of determination, which reports effect size. It would have reported the amount of the criterion variable that was explained by the predictor variables. The adjusted r^2 value corrects r^2 for positive bias, meaning it provides a value that would closer approximate the general population rather than just the sample in the study. The standard error of the estimate would have reported a measurement of the accuracy of the prediction. The coefficient table would have provided beta and standard error values for the unstandardized coefficients, beta values for the standardized coefficients, *t* values, significance levels, and coefficients (zero-order, partial, and part). The unstandardized coefficients would have reported the predictive value (strength or weakness) of each predictor variable to the criterion variable using the unique range of values to that variable. The standardized coefficients would have reported the predictive value of each predictor variable to the criterion variable on an adjusted scale to make each predictor value comparable to the next. The *t* value would have reported the significance of each regression coefficient. The partial correlations would have reported values eliminating the impact of one specific variable, and the part correlations would have reported the unique contribution of each variable (Muijs, 2011; Salkind, 2016). Table 3.5 and Table 3.6 are examples of the two tables that would have been provided.

Table 3.5: SPSS Multiple Regression Model Summary Output File

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1				

a. Predictors: (Constant), TFI, exploration, other
b. Dependent Variable: ODR

Note: ODR = Office Discipline Referral, TFI = Tiered Fidelity Inventory

Table 3.6: SPSS Multiple regression Coefficients Output File

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations		
		B	Std. Error	Beta	*t*	Sig.	Zero-Order	Partial	Part
1	(Constant)								
	TFI								
	Stage								
	other								

a. Dependent Variable: ODR

Note: ODR = Office Discipline Referral, TFI = Tiered Fidelity Inventory

Research question three. Finally, if the correlation coefficient in the first procedure was found to be statistically significant, a simple analysis of variance (ANOVA) was planned to be conducted to determine if there was variability within and between groups of school locales labeled as city, suburb, town, and rural. This analysis would have allowed for the results of the correlational study to be generalized across locales, providing external generalizability to the study and beginning to address issues of equity in PBIS implementation. The effects of Tier 1 implementation on student outcomes varied across the sample population. According to Salkind (2016), a simple analysis of variance or ANOVA is used to measure the ratio of variability *between groups* over that of *within groups,* making this an appropriate test measure for the third research question. (See Figure 9.1 in Appendix F for the rationale behind choosing this statistical procedure.) According to Salkind (2016), an ANOVA identifies an *F* value for the ratio of the variability between groups over the variability within each of the groups. Table 3.7 provides a sample of the ANOVA data for five schools included in this study. (The study's full data set is found in Appendix C.) In the first column, school buildings are listed. In the second column, SWPBIS TFI scores for Tier 1 (variable O_1) are listed in percentages for each building. In the third column, stage of implementation (variable O_2) is listed for each building. In the fourth column, the number of ODRs at the end of the year per 100 students, per day (variable O_3) are listed for each building. In the fifth column, the demographic category (variable O_4) is listed for each building.

Table 3.7: ANOVA Data Table

School Building	Stage of Implementation (O_1)	Tier 1 TFI Score (O_2)	End of Year ODRs/100 Students/Day (O_3)	Demographic Category (O_4)
1	Installation	87	0.61	City
2	Installation	87	0.18	Rural
3	Installation	77	0.75	Rural
4	Installation	93	0.68	Rural
5	Installation	93	0.41	Rural

Note: ODR = Office Discipline Referral, TFI = Tiered Fidelity Inventory

Data Collection Sources and Techniques

Sample. This study was conducted through a partnership with MIBLSI. MIBLSI is both a state and federally funded project providing training, coaching, and technical assistance around the implementation of a multi-tiered system of supports (MTSS) in local education agencies in Michigan. MIBLSI supports the use of evidence-based practices being implemented with fidelity and data-based decision-making (MIBLSI, n.d.). The MIBLSI project partners with local education agencies (both regional and district level) through a mutual selection application process. This process outlines the requirements of the project, the philosophical alignment of the project and the district, and the timeline for implementation efforts including training, technical assistance, and assessment administration. MIBLSI has numerous grants being supported throughout the project. The first data pull included all projects being supported by MIBLSI. (See Appendix D for this data set.) After discussing the complications with including all projects, it was mutually decided between the researcher and MIBLSI to only include schools participating in the School Climate Transformation Grant (SCTG) project as this would allow for the elimination of possible confounding factors in the data analysis. The SCTG project focuses on supporting the implementation of PBIS at the district and school level. The SCTG cohort focuses only on PBIS and does not include other requirements such as a specific academic component. For this reason, the stages of implementation indicators for the SCTG participating schools only include items related to PBIS. Other projects within MIBLSI have stages of implementation indicators that include both PBIS and academic markers, meaning their stage will be reported in MIBLSI's data warehousing system as a combination of PBIS and academic milestone. Given that there is no way to tease out these indicators for their other projects, the SCTG data was the only option to control for confounding factors for this study. All schools included this study have been implementing PBIS for at least one year, and data from the 2016-2017 and 2017-2018 school years were collected. Only schools with all required data for both years were included in the study, providing a sample of forty-six schools. (See Appendix C for the study’s data set.)

MIBLSI houses all project data in an online warehouse called MIDATA. This warehouse is intended to assist schools, districts, and regional educational service agencies in the collection and analysis of project relevant data. Data around reach, capacity, fidelity, and outcomes are housed and reported through this website. The data have gone through multiple cycles of usability testing, allowing the site to be designed with ease of use and access for users. All users of the MIDATA website have entered into a signed data sharing agreement with MIBLSI, which allows the project to use the data anonymously for research purposes (MIBLSI Database, 2018).

Under the allowances of an approved research application with MIBLSI (see Appendix B), the researcher accessed SCTG data for this study through a secure filed created by MIBLSI staff, including ODRs, TFI, locale, and stage of implementation data. Data were mined from the MIDATA warehouse. Hence, all participants in this study were from schools in the state of Michigan which are partnering with the SCTG project focusing on implementing PBIS. The data file for this study was received with de-identified data from the MIBLSI Evaluation and Research Unit. Data were received in an Excel file containing the following columns of data: School Number, School EEM Classification, School Stage of Implementation, 2016-2017 TFI Tier 1 Score, 2016-2017 ODR rate, 2017-2018 TFI Tier 1 Score, and 2017-2018 ODR rate. The codes for School EEM Classification were city, suburb, town, or rural, which was pulled by MIBLSI staff from the Educational Entity Master (EEM) system through Michigan's Center for Educational Performance and Information (CEPI). The school stage of implementation was coded as a) Pre-Exploration/Adoption, b) Exploration/Adoption, c) Installation, d) Initial Implementation, e) Elaboration, or f) Continuous Regeneration. Scores for TFI Tier 1 Scores were reported numerically. The ODR rates were reported numerically and included whole numbers up to the 100ths decimal range (e.g. 1.09, 0.65, etc.).

Once all data were received from the MIBLSI project staff, data were entered into SPSS using the same four categories as mentioned above: school EEM classification entered into SPSS as locale, school stage of implementation entered into SPSS as stage, TFI Tier 1 score entered into SPSS as TFI, and ODR rate entered into SPSS as ODR. All reports were generated from this data file. The School EEM classification named locale were coded as follows: 1 = city, 2 = suburb, 3 = town, and 4 = rural. The stage of implementation was coded as follows: 1 = pre-exploration/adoption, 2 = exploration, 3 = installation, 4 = initial implementation, 5 = elaboration, and 6 = continuous regeneration.

Measures. The three main variables in this study were the TFI, ODRs, and stages of implementation. The TFI was compiled by national experts in the area of PBIS and was evaluated to assure its reliability and validity. The TFI was designed as an evaluation tool that combines multiple assessments, which were traditionally used to measure various areas of PBIS implementation. According to Algozzine et al. (2014), "The purpose of the TFI is to provide one efficient yet valid and reliable instrument that can be used over time to guide both implementation and sustained use of SWPBIS" (p. 3). This instrument was developed, vetted, and validated with multiple field tests and research studies. Not only is this instrument valid and reliable, it is efficient in bringing together multiple instruments and allowing districts to use one document to analyze implementation efforts. Three studies were conducted to evaluate the psychometric properties of the measure: a content validity study, a usability and reliability study, and a large-scale validation study. The content validity study reported some items on the TFI to be below 80% content validity, and those items were removed from the assessment. All other items rated above 80% and remain on the tool. The usability and reliability study reported an interrater reliability of .99 (99%) and a test-retest reliability of .99 (99%). Minor tweaks were made to the wording of some items on the assessment based on user feedback. The large-scale validation study reported internal consistency of .96 (96%) using the coefficient alpha. Each school in the study has been implementing PBIS for at least one year; however, the level of implementation at each school varies and changes at a different rate. Some schools have a score of 70%+ on the TFI, while others are below 70%. According to research conducted around the TFI, a score of 70% indicates that PBIS is being implemented with fidelity and is sustainable, while a score under 70% indicates a lack of implementation fidelity and a low probability of sustainability (McIntosh, Massar, Algozzine, George, Horner, Lewis, & Swain-Bradway, 2017). In the most recent study done around the factor validation of the SWPBIS TFI, Massar, McIntosh, Mercer, and Hoselton (in press) found that the SWPBIS TFI is a valid measure of implementation fidelity of SWPBIS which not only can be used to measure implementation at the individual tier level, but it can also be used to measure implementation by subscales and as a comprehensive assessment of all three tiers. This new body of research extends previous validation studies from the tier level to the subscale and comprehensive levels. Given that the National PBIS Technical Assistance Center is promoting this tool on a national level, this tool was chosen to be used within this study. The fidelity percentage score reached on the Tier 1 portion of the TFI was the independent variable in this study.

The dependent variable in this study was the number of ODRs at the end of the year per 100 students, per day. The data were collected through SWIS, a data warehousing system which analyzes information around student ODRs at the school level. All schools participating in this study are supporting the use of the SWIS in order to assess student outcome data. SWIS is a data system for school discipline that was developed by PBIS researchers and experts. According to Educational and Community Supports (2016), “SWIS Suite has assisted teams to improve their internal decision making and overall support plan design for individual students and their families.” Administrators, teachers, and leadership teams use the SWIS data to inform supports that are needed in various settings, at various times, and around various problem behaviors throughout the school year. This tool has been vetted and validated by national PBIS experts. Additionally, no other system has allowed educators to analyze student discipline data with as deep a level of scrutiny as SWIS (Educational and Community Supports, 2016). MIBLSI has chosen to use this decision-making system with all schools implementing PBIS through their partnership work (MIBLSI, n.d.). SWIS generates many reports to support data analysis, and one of them displays the average number of student ODRs per year, per 100 students, per day. These data were used as the dependent variable in the study.

Both the TFI assessment and the SWIS data-based decision-making system require a facilitator who is external to the school to ensure valid and reliable results. The TFI requires minimal training, but it requires a great deal of knowledge around the practices of PBIS. Additionally, research provided by Algozzine et al. (2014) in the SWPBIS TFI states that an external facilitator is essential for administration of the tool in order to have accurate, non-inflated results. Because of this information, schools in this study depended upon external experts from their local districts or education service agencies to conduct the assessments and train district and school personnel in the data collection, entry, and analysis. The TFI data were collected during school leadership team meetings through the use of a simultaneous voting structure and a consensus discussion process. Once all data were collected, it was entered into the PBIS Technical Assistance Center website for storage and mining. This system allows schools and districts to not only print standard reports, but it also produces data analysis reports based on summative and subscale data. The system aggregates scores around common features and indicates a percentage of implementation fidelity on both the subscale and overall level. Once the data were entered into the PBIS Technical Assistance Center website, summative scores were transferred into MIBLSI online database by the designated data entry staff member at the school or district level. All data for this study were accessed via a secure file from MIBLSI staff that was mined from the MIBLSI database. The SWPBIS TFI assessment was conducted up to three times per year until a high level of implementation was reached. Once the school reached a score of 70% on their implementation fidelity, it conducted this assessment once per year in an effort to monitor the progress of implementation and ensure that it was continuing to implement with fidelity. The SWPBIS TFI Tier 1 percentage scores for the end of the year collection point (spring) were used as the independent variable in this study as this timepoint is when schools in the SCTG project progress monitored their Tier 1 implementation. This timepoint allowed for the maximum number of schools to be included in the data set as schools missing TFI data were not included in the secure file.

Similar to the SWPBIS TFI, the SWIS data system requires an external facilitator in order for districts to open an account and to ensure valid and reliable data. This is one way that SWIS ensures that their product is implemented at high levels of fidelity. District staff members as well as consultants from regional education service agencies act as SWIS facilitators for the participating schools. The process for using this data requires each school to go through training around the data as well as the behavior definitions that are built into the system. Data were entered into this system by a designated school staff member on a daily or weekly basis (dependent upon the school's data entry expectations). ODRs were entered into the system, which includes the student name, student grade, date of behavior incident, time of behavior incident, location of behavior incident, problem behavior category, perceived motivation of problem behavior, other students involved in the incident, staff member referring the student, and other information as customized by the school. Once the information was entered, school staff were able to pull aggregated reports providing summative information around the school's ODR rates. Reports were only available to staff with access to the school account and were pulled at the school level. Additionally, school leadership teams were able to use a drill down function to analyze specific data around behaviors. For example, a school team could identify that there were a substantial amount of ODRs coming from fifth grade girls during recess on Mondays with a majority of them being bullying/harassment and a perceived motivation of gaining peer attention. This type of analysis allows the team to problem-solve and put interventions in place to prevent specific problem behaviors. Once the data were entered into the SWIS database, summative scores were transferred into the MIDATA database by the designated data entry staff member at the school or district level. Data were then accessed by MIBLSI staff, who mined the data from the MIDATA database. For this study, ODR data were used in a summative nature to identify if the implementation of Tier 1 PBIS was correlated with the average rate of ODRs per year, per 100 students, per day for each participating school.

Finally, stages of implementation were assigned to schools in MIDATA based upon predetermined criteria through the MIBLSI training and coaching sequence. A specific PBIS training and coaching sequence was used with the SCTG project, which is called Michigan's Promoting Positive School Climate (PPSC) project. The stages of implementation were identified for PBIS work only using the stages of implementation indicators as established through the PPSC project (Michigan's Promoting Positive School Climate Project, 2015). (See Appendix E for the MIBLSI PPSC School Stages of Implementation Indicators.)

Data Analysis Techniques

Research question one. The correlational analyses began with statistical tests to see if the data set met the assumptions of normality (continuous data, linear relationship, no significant outliers, approximates a normal distribution). For the computation of the correlation coefficient, data on two variables were collected: Tier 1 PBIS implementation fidelity and student problem behaviors as measured by the average number of ODRs at the end of the year, per 100 students, per day. PBIS implementation fidelity data at the school level were collected through the SWPBIS TFI. Given that these variables were found to meet the assumption of normality (linearity, homoscedasticity, multicollinearity, outliers, and residual errors), the correlation was conducted as planned. The *r* value was used to determine the statistical significance of the correlation coefficient with the level of significance being 0.05. A correlation was considered strong when there was a high correlational value (positive or negative). A correlation was considered weak or non-existent when there was a low correlational value (positive or negative). The strength of the correlation did not indicate statistical significance. Only the significance level (*r* value) indicated if the correlation was statistically significant. A correlation coefficient table was generated to address the first research question of whether or not there was a statistically significant association between Tier 1 PBIS implementation fidelity and decreased student problem behaviors. The score for the Tier 1 TFI was the independent variable, and ODR rate was the dependent variable. Both scores were entered into the variables box in SPSS. Once the output file was generated, an *r* value was revealed and analyzed according to significance levels. According to Salkind (2016), the *r* value reveals the strength of the correlation. The closer the *r* value is to 1.0, the stronger the association between variables. Also, according to Salkind, the strength of the correlation can be broken into five categories: .0 to .2 identifies a weak or no association; .2 to .4 identifies a weak association; .4 to .6 identifies a moderate association; .6 to .8 identifies a strong association; and .8 to 1.0 identifies a very strong association (2016). Once the correlation coefficient was determined, the *r* value was analyzed to determine the strength of the correlation. This value was interpreted based upon Salkind (2016), who states the that the closer to 1 or -1 an r^2 value is, the more the independent variable explains the dependent variable. When the value is 0, the independent variable is not related to the dependent variable. The significance level for this output was set at 0.05 (Salkind, 2016). These data were planned to be used in comparison with the multiple regression analysis in question two.

Research question two. Before the multiple regression was to be run in SPSS, the data set was tested to see if such a statistical procedure was warranted. The data set was tested for linearity and homoscedasticity. These tests were conducted through the analysis of scatterplots. Then, if warranted, a multiple regression analysis was planned to be conducted using SPSS to address the second research question around predictive validity of the independent variable (stage of implementation) and the dependent variable (ODR rate). The significance level for this output was planned to be set at 0.05 (Salkind, 2016). The equation for the multiple regression was planned to be $Y' = b_0 + b_1T_1 + b_2S_1 + \varepsilon$ (Muijs, 2011). Given that the variables did not meet the assumptions for a multiple regression, the analysis was not conducted beyond testing for linearity and homoscedasticity.

Research question three. Finally, if positive results were found from the first research question, a simple analysis of variance (ANOVA) was to be run to address the third research question. Through an analysis of the differences between the means of groups, this statistical procedure would have analyzed the data and identified any variability of student discipline outcomes (number of ODRs) within and between groups of schools based on their EEM demographic locale of city, suburb, town, or rural. The data set would have been disaggregated into four groups based on their identified locales. The SPSS output file would have reported the following information for the ANOVA: the sum of squares, degrees of freedom, mean square, *f* value, and level of significance. Salkind (2016) states the significance level reported in the SPSS ANOVA file indicates if the null hypothesis can be accepted or rejected. If the significance level is less than 0.05, there is a statistically significant difference between groups. If the significance value is greater than 0.05, there is not a statistically significant difference between groups. Additionally, Salkind (2016) demonstrates how an effect size can be calculated from the ANOVA output file in SPSS. The effect size is calculated by taking the between-groups sum of square and dividing it by the total sum of squares. If these calculations would have been completed, the effect size could have been be measured based on Salkind's descriptors: .01 = small effect size, .06 = medium effect size, and .14 = large effect size. However, since question one did not reveal statistical significance, the ANOVA was not conducted. In order to attempt to analyze locales, correlational analyses were conducted around a disaggregated data set for city, suburb, town, and rural. The variables were found to meet the assumptions of normality (linearity, homoscedasticity, multicollinearity, outliers, and residual errors). Table 3.8 provides a sample representation of the 2017-2018 correlational study for five suburb schools included in this study. (The study's full data set can be found in Appendix C.) In the first column, school buildings are listed. In the second column, SWPBIS TFI scores for Tier 1 percentages (variable O_1) are listed for each building. In the third column, student problem behaviors measured by the number of ODRs at the end of the year, per 100 students, per day (variable O_2) are listed for each building.

Table 3.8: Correlational Design Study Table

School	TFI (O_1)	ODR (O_2)
15	80	1.04
16	83	1.70
17	100	0.57
18	90	0.59
19	80	0.74

Note: ODR = Office Discipline Referral, TFI = Tiered Fidelity Inventory

The output file from SPSS reported data for the Pearson correlation (revealing an *r* value describing direction and strength), significance level (revealing the *p* value or level of significance), and the *n* value (size of the sample). If the significance level (*p* value) was below 0.05, the data were noted with a double asterisk. Table 3.9 is an example of a correlation table that was generated by SPSS.

Table 3.9: SPSS Correlation Output File

		TFI	ODR
TFI	Pearson Correlation		
	Sig. (2-tailed)		
	N		
ODR	Pearson Correlation		
	Sig. (2-tailed)		
	N		
** Correlation is significant at the 0.05 level (2-tailed).			

Note: ODR = Office Discipline Referral, TFI = Tiered Fidelity Inventory

Additionally, a scatterplot with a line of best fit was generated to provide a visual representation of the correlation. Since the TFI score was the independent variable, it was placed on the X axis of the graph. ODR data was the dependent variable and was placed on the Y axis. This display included the r^2 value. The r^2 value represents squaring the correlation coefficient to determine what percentage of the variance of the dependent variable can be explained by the independent variable (Salkind, 2016). Since the sample sizes for the disaggregated data were under thirty, t tests were conducted for the dependent variable (ODRs) to determine if the sample approximated the larger data set. Finally, a correlational matrix was created to compare data for both the 2016-2017 data and the 2017-2018 data for each locale.

Table 3.10 is a methodology table or plan describing research techniques, data collection sources and techniques, and data analysis techniques that were used or planned to be used for each research question.

Table 3.10: Methodology Table

Research Questions	Research Techniques	Data Collection Sources and Techniques	Data Analysis Techniques
1. Is there a statistically significant association between SWPBIS TFI Tier 1 percentage score and the rate of student problem behaviors as measured by ODRs reported in SWIS?	• Statistical tests were conducted around the assumptions of normality (continuous data, linear relationship, no significant outliers, approximates a normal distribution) • Correlation coefficients were computed for the two variables: SWPBIS TFI scores for Tier 1 (percentages) and the average number ODRs at the end of the year per 100 students, per day. • Analysis of the two variables was run to find the *r* value.	• Schools entered TFI data into MIDATA from TFI assessment. Data were mined from the MIDATA website by MIBLSI staff and was sent to the researcher as unidentified data in a secure file. • Schools entered ODR information into SWIS. The schools transferred ODR data from SWIS into MIDATA. Data were mined from the MIDATA website by MIBLSI staff and sent to the researcher as unidentified data in a secure file. • SPSS was used to calculate the correlation coefficient and find the *r* value.	• Data were collected identifying the percentage of Tier 1 PBIS implementation using the TFI. • Student outcome data were analyzed to identify the average number of ODRs at the end of the year per 100 students, per day. Reports generated from SWIS and mined via the MIDATA database were used to analyze the results. • The *r* value was analyzed to determine if the correlation of the two variables was statistically significant. The significance level was set at 0.05.
2. What is the predictive validity of SWPBIS TFI Tier 1 percentage score and Tier 1 PBIS stage of implementation on	• Tests were run to determine if a multiple regression was warranted with the given data set. The tests	• Data were accessed via the unidentified, secure data file received by MIBLSI.	• Tests for linearity and homoscedasticity were conducted through analysis of scatterplots. • A multiple

the rate of student problem behaviors as measured by ODRs reported in SWIS?	included an analyzation of linearity and homoscedasticit y. • If warranted, an analysis of multiple regression would have been run to determine the predictive validity of the independent (predictor) variables on the dependent (criterion) variable.		regression analysis was planned but was not conducted due to the results of the tests for linearity and homoscedasticity. • SPSS was used to generate all reports.
3. Given a positive finding in question one, is there external generalizability across demographic locales (city, suburb, town, and rural) after controlling for stage of implementation when Tier 1 of PBIS is implemented with fidelity as measured by the SWPBIS TFI?	• A simple analysis of variance (ANOVA) would have been run to determine if there is a statistically significant variance within and between the identified groups of schools (locales). Correlations were computed for the subgroups of city, suburb, town, and rural. Since the sample size was below thirty, t-test were run to determine if the sample	• Data were accessed via the unidentified, secure data file received by MIBLSI.	• An ANOVA was planned to be conducted to determine if there was variability in associations across the demographic school locales of city, suburb, town, and rural. • Correlational analyses were conducted to attempt to answer this research question. • T tests were conducted given the low sample size for each locale. • The *r* value was analyzed to determine if the

	population associated the larger population.		correlation of the two variables (TFI and ODRs) was statistically significant. The significance level was set at 0.05.

Note: MIBLSI = Michigan's Integrated Behavior and Learning Support Initiative, ODR = Office Discipline Referral, SWIS = School-Wide Information System, SWPBIS = School-Wide Positive Behavioral Interventions and Supports, TFI = Tiered Fidelity Inventory

Research Ethics

Throughout this study, confidentiality of the data received from MIBLSI was upheld. MIBLSI entered into data sharing agreements with all partnering districts and schools; so they have the right to use the data that is shared for research purposes in an anonymous manner. Additionally, a research partnership application was approved allowing access to data for this study (Appendix B). Given that the data were supplied in a de-identified manner and under a research partnership agreement, no individual or organizational names were attached to any data points, allowing for complete anonymity of all schools. Finally, an Institutional Review Board (IRB) application was submitted to obtain official institutional approval from the university to conduct this study with dissertation advisor approval. The IRB indicated that this study was exempt from IRB regulations as it was considered non-regulated. (See Appendix A for the IRB Approval Letter.)

Chapter Summary

This methodology chapter has explained the overall research design, including the problem statement and research questions; hypotheses; relevance of the selected design to the desired outcomes; research techniques; data collection sources and analysis techniques; and intended research ethics. The goals of this study were to a) determine if there was statistically significant association between Tier 1 SWPBIS implementation fidelity and the rate of student problem behaviors, b) analyze the predictive validity of Tier 1 SWPBIS implementation fidelity and Tier 1 PBIS stage of implementation on the rate of student problem behaviors, and c) determine if there was generalizability of positive outcomes across groups of schools based on the locales of city, suburb, town, and rural. This study aimed to support the use of PBIS to reduce student problem behaviors. The analysis of the correlation coefficient demonstrated the strength and significance of the association between the percentage score of Tier 1 PBIS implementation fidelity and student problem behaviors as measured by ODRs. The multiple regression analysis was planned to determine the predictive validity of the SWPBIS TFI Tier 1 percentage score and the SCTG stage of implementation on positive student behavioral outcomes. Finally, the ANOVA was planned to demonstrate external generalizability of the results across the demographic locales of city, suburb, town, and rural. These statistical tests were planned to inform readers around the effectiveness of PBIS at addressing student problem behaviors as well as the external generalizability of positive results across locales. This study was operationalized through the implementation of research validated instruments and thorough analysis.

CHAPTER FOUR

ANALYSIS AND FINDINGS

Statistical analyses were conducted to determine the answers to the research questions posed in this study. First, a series of descriptive statistical analyses were conducted to understand the trends of the data set that was obtained from Michigan's Integrated Behavior and Learning Support Initiative's (MIBLSI) School Climate Transformation Grant (SCTG) participating schools for the 2016-2017 and 2017-2018 school years. Following the descriptive analyses, statistical procedures were attempted as appropriate for each of the research questions. This chapter begins with a descriptive statistical analysis followed by findings and analyses for research questions one, two, and three. This chapter will report on all analyses around statistical procedures that were carried out using SPSS.

Office Discipline Referrals Descriptive Statistics

School-Wide Information System (SWIS) data around office discipline referrals (ODRs) from the SCTG 2016-2017 and 2017-2018 cohorts were compared to SWIS's national ODR data reporting for those same years. As can be seen from Table 4.1, six columns of data were reported representing the 2016-2017 data for all of the SCTG participating schools, the national ODR data from SWIS, and disaggregated ODR data from the SCTG participating schools representing the four locales of city, suburb, town, and rural. For each column, data for sample size (*n*), mean, median, lower quartile (25%), upper quartile (75%), and standard deviation were reported. There were forty-six SCTG participating schools included in the data set. When disaggregated by locale, the forty-six SCTG participating schools contained one city school (causing this data to be flat across the descriptive analyses), twenty-three suburban schools, nine town schools, and thirteen rural schools. The data for these columns were then compared to the ninety-two Prek-12 schools included in the national ODR data summary report (see Appendix G). When comparing the SCTG data to the national ODR data, it is clear that the mean number of ODRs per 100 students, per day is much lower for the SCTG participating schools (.34-.65) than the national cohort of schools (.90), with the exception of those schools falling in the town locale (1.30). Conversely, all of the SCTG data are higher for median number of ODRs per 100 students, per day (.34-1.08) when compared to the national data, which has a median of .26. For the lower quartile (25%), all SCTG data (.19-.34) are higher than the national data (.15) with the exception of those schools falling in the rural locale (.14). For the upper quartile (75%), three of the SCTG categories are higher than the national data (.65): SCTG (.88), Suburb (.97), and Town (2.5). Two of the SCTG categories are lower: City (.34) and Rural (.64). Finally, the standard deviation for all SCTG columns of data fall significantly below the national data with the SCTG's data ranging from 0 to 1.10 and the national data being 2.15.

Table 4.1: 2016-2017 ODR Descriptive Data

	SCTG	National PreK-12 ODR	City	Suburb	Town	Rural
N	46	92	1	23	9	13
Mean	.65	.90	.34	.56	1.30	.38
Median	.40	.26	.34	.37	1.08	.37
25%	.22	.15	.34	.19	.19	.14
75%	.88	.65	.34	.97	2.5	.64
Standard Deviation	.68	2.15	0	.49	1.10	.25

Note: ODR = Office Discipline Referrals, SCTG = School Climate Transformation Grant

Similarly, Table 4.2 displays the data for 2017-2018 with the same six columns as the 2016-2017 data set: data for all of the SCTG participating schools, the national ODR data, and disaggregated data from the SCTG participating schools representing the four locales of city, suburb, town, and rural. Again, data for sample size (*n*), mean, median, lower quartile (25%), upper quartile (75%), and standard deviation were reported for each column. The same forty-six SCTG participating schools from the 2016-2017 data were also included in the 2017-2018 data set, which disaggregated to the same locale numbers of one city school, twenty-three suburban schools, nine town schools, and thirteen rural schools. The data for these columns were then compared to the ninety-one Prek-12 schools included in the national ODR data summary report (see Appendix G). When comparing the SCTG data to the national data for 2017-2018, the same pattern was found as in the 2016-2017 data set. The mean number of ODRs per 100 students, per day is much lower for the SCTG participating schools (.46-.77) than the national cohort of schools (.96), with the exception of those schools falling in the town locale (1.56). Again, the median data for all of the SCTG data are higher (.41-1.47) when compared to the national data, which has a median of .31. Again, as was seen in the 2016-2017 data, the lower quartile (25%) for all SCTG data (.25-.61) are higher than the national data (.14) with the exception of those schools falling in the rural locale (.07). Again, comparisons for the upper quartile (75%) have mixed results when compared to the national data. Two of the SCTG categories are higher than the national data (.85): Suburb (.95) and Town (2.12). Three of the SCTG categories are lower: SCTG (.61), City (.61), and Rural (.77). Finally, while not as significant of a difference as the 2016-2017 data, the standard deviation for all SCTG columns of data falls below the national data with the SCTG's data ranging from 0 to 1.15 and the national data being 1.82.

Table 4.2: 2017-2018 ODR Descriptive Data

	SCTG	National PreK-12 ODR	City	Suburb	Town	Rural
N	46	91	1	23	9	13
Mean	.77	.96	.61	.64	1.56	.46
Median	.61	.31	.61	.57	1.47	.41
25%	.25	.14	.61	.25	.59	.07
75%	.61	.85	.61	.95	2.12	.77
Standard Deviation	1.03	1.82	0	.45	1.15	.36

Note: ODR = Office Discipline Referrals, SCTG = School Climate Transformation Grant

Boxplots were also generated for the SCTG-ODR data using SPSS. Figure 4.1 displays the boxplot for the SCTG-ODR data for 2016-2017. The median (.40) is represented by the line inside of the box, and the box boundaries represent the interquartile ranges of .22 to .40 and .40 to .88. The whiskers represent the outer quartile ranges of .01 to .22 and .88 to 1.39. There are three data points that are considered outliers as indicated by the small circles. Two circles are overlapping and are labeled "16" and "17." These circles represent two values of 2.538. The other circle is labeled "45" and represents a value of 1.956. One data point is considered an extreme outlier as indicated by the star. This data point is labeled "23" and represents a value of 2.87 (Fraenkel et al., 2015).

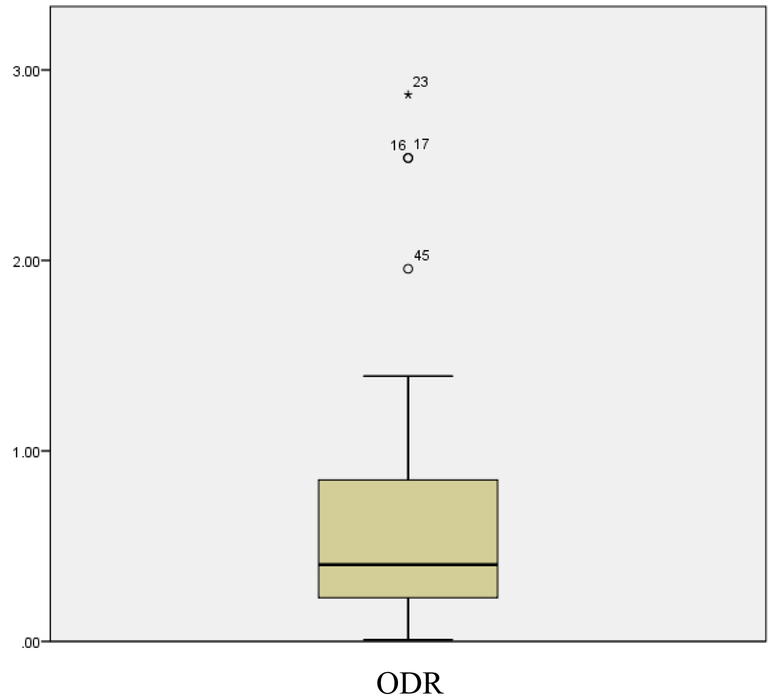


Figure 4.1: Boxplot of 2016-2017 School Climate Transformation Grant (SCTG) office discipline referrals (ODRs)

Figure 4.2 displays the boxplot for the SCTG-ODR data for 2017-2018. Again, the median (.61) is represented by the line inside of the box, and the box boundaries represent the interquartile ranges of .25 to .61 and .61 to 1.03. The whiskers represent the outer quartile ranges of .02 to .25 and 1.03 to 2.12. There is one data point which is considered an extreme outlier as indicated by the star. This data point is labeled “23” and represents a value of 4.071 (Muijs, 2011).

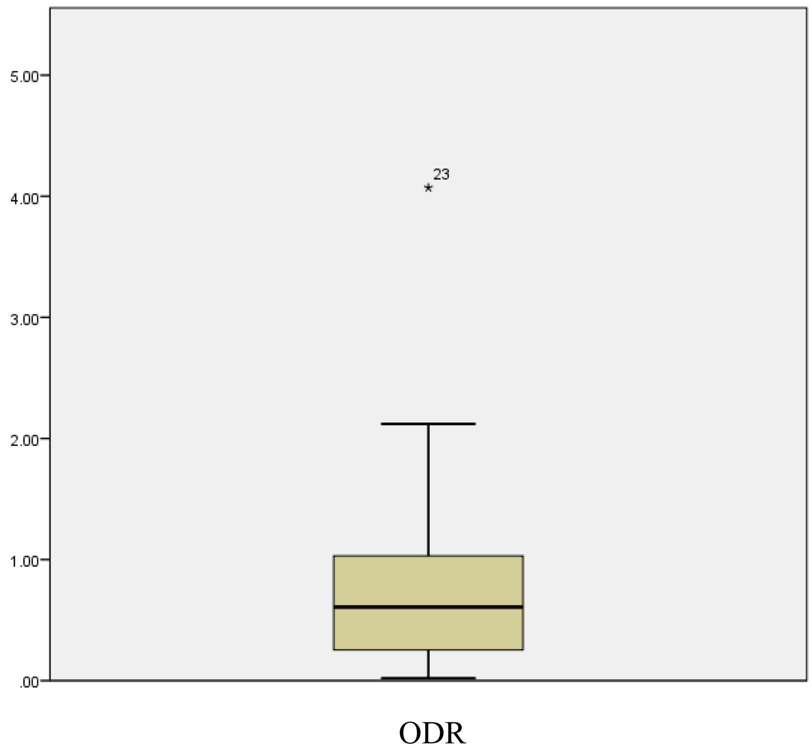


Figure 4.2: Boxplot of 2017-2018 School Climate Transformation Grant (SCTG) office discipline referrals (ODRs)

Histograms of SCTG-ODR data were also generated using SPSS. Figure 4.3 displays the data for 2016-2017. This figure clearly displays a peak in the data between .00 and .25. The data do not follow a normal distribution; so there is no symmetry in the curve. Additionally, the curve is right skewed with outliers on the far right between 2.50 and 3.00 (Muijs, 2011).

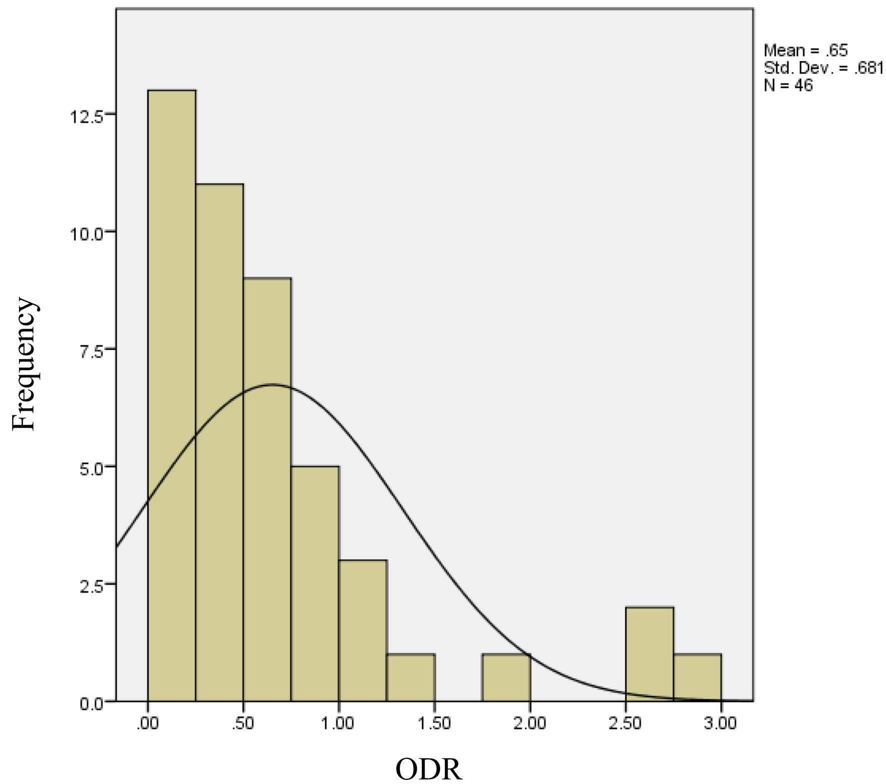


Figure 4.3: Histogram of 2016-2017 School Climate Transformation Grant (SCTG) office discipline referrals (ODRs)

A histogram of SCTG-ODR data for 2017-2018 is displayed in Figure 4.4. Similarly, this figure clearly displays a peak in the data between .33 and .67. Again, these data do not follow a normal distribution, so there is no symmetry in the curve. This curve is also right skewed with outliers on the far right between 4.00 and 4.33 (Muijs, 2011).

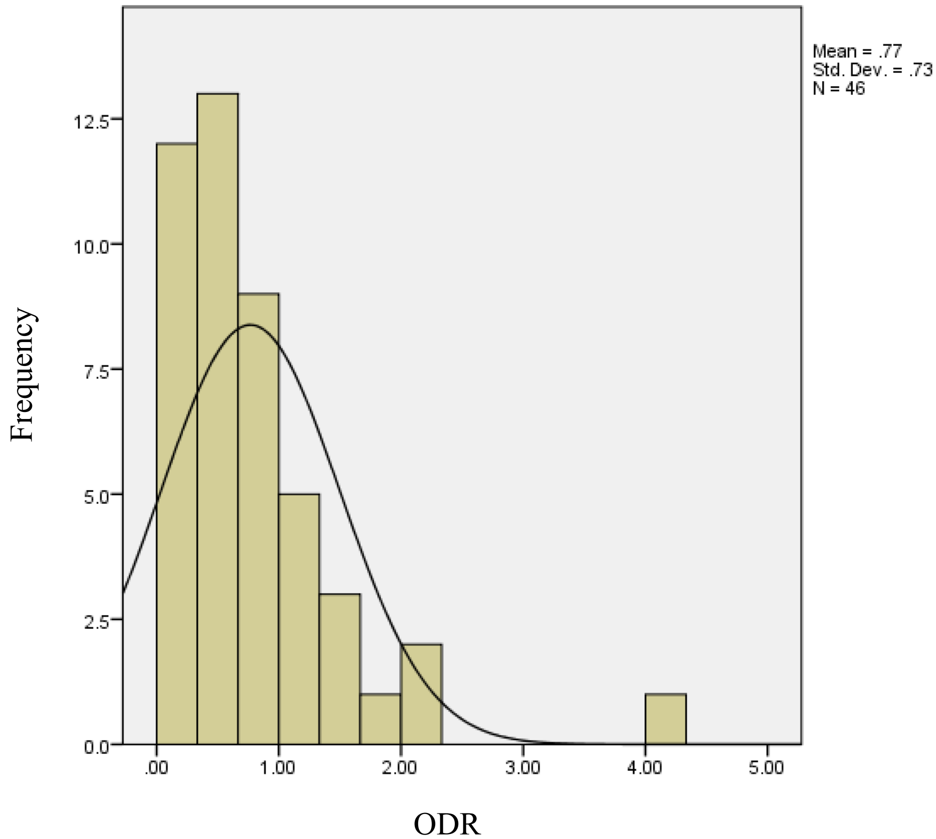


Figure 4.4: Histogram of 2017-2018 School Climate Transformation Grant (SCTG) office discipline referrals (ODRs)

When comparing the SCTG data set to the national summary for the daily average ODRs per 100 students as reported in SWIS, the SCTG data set is consistently below the national mean for both 2016-2017 and 2017-2018. This trend continues each year when looking at the disaggregated data around locales with the exception of one locale: town. However, the general trend is that SCTG participating schools are reporting fewer ODRs when compared to the national data set.

TFI Descriptive Statistics

Tier 1 PBIS TFI data for the SCTG were collected for both the 2016-2017 and 2017-2018 school years. While these data do not have a national data set with which to compare, research has been conducted to determine a fidelity threshold of 70%. This means that once a school reaches fidelity (70% or higher), they should realize expected outcomes, specifically a decrease in problem behaviors (Mercer et al., 2017; Massar et al., in press 2017). As can be seen in Tables 4.3 and 4.4, the majority of schools in this study have reached the threshold of fidelity on the TFI.

In the 2016-2017 data set, only eleven schools had a Tier 1 PBIS TFI score below the 70% threshold, with only four of those schools being below 60%. Table 4.3 displays the descriptive data for the 2016-2017 SCTG Tier 1 TFI data. As with the ODR data, there are forty-six schools in the full data set, one school labeled as city, twenty-three schools labeled as suburb, nine schools labeled as town, and thirteen schools labeled as rural. In 2016-2017, the highest mean Tier 1 TFI score of eighty-one was for the suburb subgroup. The lowest mean Tier 1 TFI score of seventy-five was for the rural subgroup. The highest median score of ninety was for the rural subgroup, and the lowest median score of seventy-seven was for the city and town subgroups. With the rural subgroup having the lowest mean as well as the highest median, it is no surprise that this subgroup also has the highest standard deviation of twenty-seven. The lowest standard deviation belongs to the city subgroup; however, this is due to the fact that there is only one school's data reported in this group. The next lowest standard deviation of fourteen belongs to the Suburb subgroup. Since standard deviation reports the distance from the mean, a high standard deviation means that the values are more spread out over a wider range of values.

This means that the suburb group, which has the largest sample size, has the widest range of values.

Table 4.3: 2016-2017 Tier 1 TFI Descriptive Data

	SCTG	City	Suburb	Town	Rural
N	46	1	23	9	13
Mean	78	77	81	76	75
Median	83	77	83	77	90
25%	70	77	77	65	64
75%	91	77	90	92	95
Standard Deviation	19	0	14	19	27

Note: SCTG = School Climate Transformation Grant

In the 2017-2018 data, only three schools had scores below 70%, one being at 43%, one being at 50%, and one being at 63%. Table 4.4 displays the descriptive data for the 2017-2018 SCTG Tier 1 TFI data. Again, the categories of the full data set, SCTG, city, suburb, town, and rural are presented. In 2017-2018, the highest mean Tier 1 TFI score of ninety-two was for the town subgroup. The lowest mean Tier 1 TFI score of eighty-two was for the rural subgroup. The highest median score of ninety was for the town subgroup, and the lowest median score of eighty-seven was shared across three subgroups: city, suburb, and rural. Again, the rural subgroup has the highest standard deviation of seventeen. The lowest standard deviation belongs to the city subgroup again; however, this is due to the fact that there is only one school's data reported in this group. The next lowest standard deviation of seven belongs to the town subgroup.

Table 4.4: 2017-2018 Tier 1 TFI Descriptive Data

	SCTG	City	Suburb	Town	Rural
N	46	1	23	9	13
Mean	86	87	87	92	82
Median	89	87	87	90	87
25%	82	87	80	90	80
75%	93	87	93	97	93
Standard Deviation	12	0	9	7	17

Note: SCTG = School Climate Transformation Grant

Boxplots were also generated for the SCTG Tier 1 TFI data using SPSS. Figure 4.5 displays the boxplot for the SCTG Tier 1 TFI data for 2016-2017. The median (83) is represented by the line inside of the box, and the box boundaries represent the interquartile ranges of 70 to 83 and 83 to 91. The whiskers represent the outer quartile ranges of 60 to 70 and 91 to 100. There are four data points that are considered outliers as indicated by the small circles. Two circles are overlapping and are labeled “20” and “34” representing two values of 37. The other two circles are labeled “35” and “36” representing the values 23 and 20 respectively (Muijs, 2011).

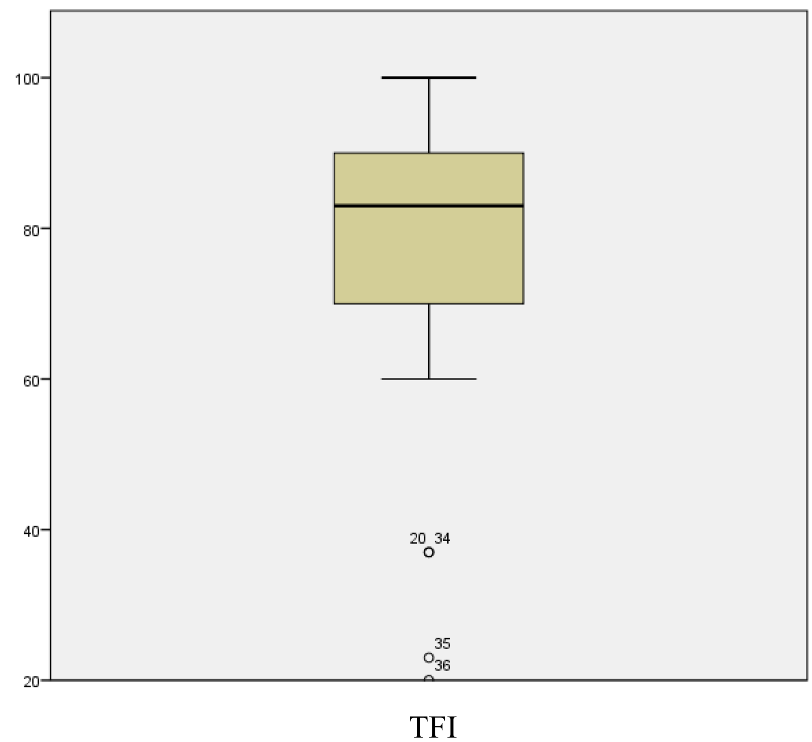


Figure 4.5: Boxplot of 2016-2017 School Climate Transformation Grant (SCTG) Tier 1 Tiered Fidelity Inventory (TFI)

Figure 4.6 displays the boxplot for the SCTG Tier 1 TFI data for 2017-2018. The median (86) is represented by the line inside of the box, and the box boundaries represent the interquartile ranges of 82 to 86 and 86 to 93. The whiskers represent the outer quartile ranges of 70 to 82 and 93 to 100. There is one data point that is considered an outlier as indicated by the small circle labeled “20” and represents a value of 63. Two data points are considered extreme outliers as indicated by the star. These data points are labeled “35” and “36” and represent the values 50 and 43 respectively (Muijs, 2011).

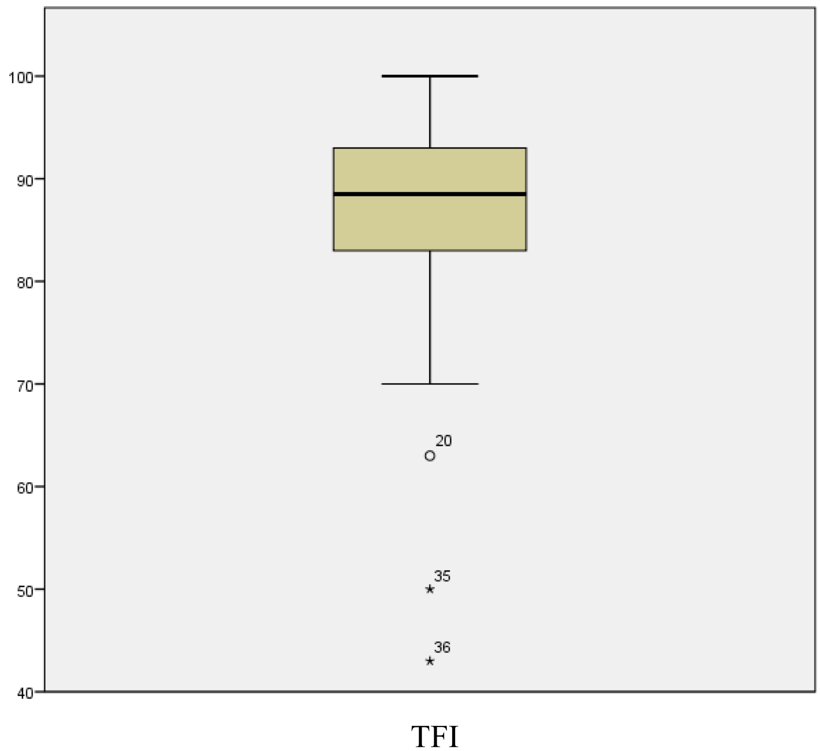


Figure 4.6: Boxplot of 2017-2018 School Climate Transformation Grant (SCTG) Tier 1 Tiered Fidelity Inventory (TFI)

Histograms of SCTG Tier 1 TFI data were also generated. Figure 4.7 displays the data for 2016-2017. This figure displays a peak in the data between 87 and 93. As indicated outside of the graph on the top, upper righthand corner of the graph, these data approximate a normal distribution, meaning that there is symmetry in the curve. Nonetheless, the curve is left skewed with outliers on the left between 20 and 40 (Muijs, 2011).

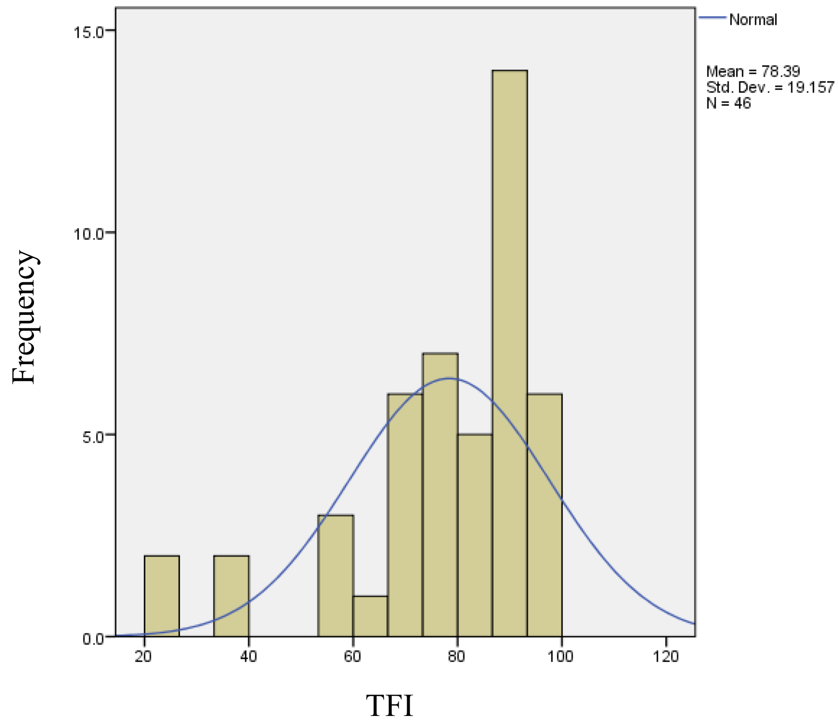


Figure 4.7: Histogram of 2016-2017 School Climate Transformation Grant (SCTG) Tier 1 Tiered Fidelity Inventory (TFI)

A histogram of SCTG Tier 1 TFI data for 2017-2018 is displayed in Figure 4.8. This figure displays a peak in the data between 85 and 90. As indicated outside of the graph on the top, upper righthand corner of the graph, these data approximate a normal distribution, meaning that there is symmetry in the curve. As is the case with the 2016-2017 data, the curve is left skewed with outliers on the left between 20 and 40 (Muijs, 2011).

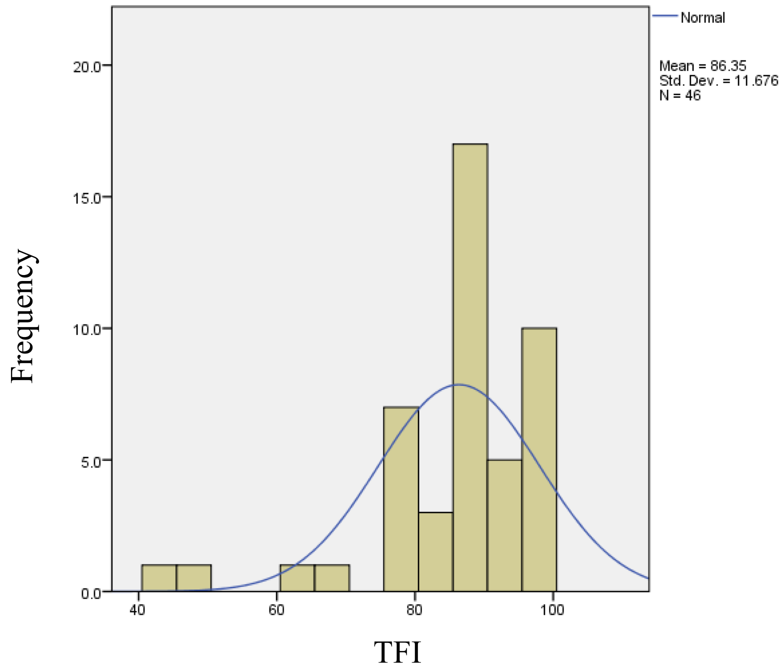


Figure 4.8: Histogram of 2017-2018 School Climate Transformation Grant (SCTG) Tier 1 Tiered Fidelity Inventory (TFI)

The TFI data for the SCTG data set has two main findings. First, the data reveal that SCTG participating schools are reporting mean TFI scores above the 70% fidelity threshold across the full data set as well as across the disaggregated data sets by locale. This finding is significant, especially given the SCTG data set is also reporting ODRs at a rate that is lower than the national average. Since the national data set is not controlled for implementation fidelity, the conclusion can be drawn that schools implementing at higher levels of fidelity are more likely to have their average daily ODRs per 100 students fall below the national average. Second, when comparing the 2016-2017 data table with the 2017-2018 data table, the TFI scores are increasing over time. The conclusion can be drawn that SCTG participating schools' implementation levels improve over time.

Research Question One Findings and Analysis

The first research question in this study asked if there was a statistically significant association between Tier 1 School-Wide Positive Behavior Interventions and Supports (SWPBIS) TFI percentage and student problem behaviors as measured by ODRs reported in SWIS. These variables were screened to see if they met the assumptions of normality (continuous data, linear relationship, no significant outliers, approximates a normal distribution). Although not all assumptions were met, robust statistical analysis of the correlations were conducted. All results reported for research question one must be interpreted with caution. Using the data set provided by MIBLSI for the SCTG participating schools, correlational procedures were conducted for both the 2016-2017 and 2017-2018 school years for the total cohort (forty-six schools).

Table 4.5 displays the Pearson correlation output from SPSS for the SCTG for 2016-2017 and 2017-2018. The Pearson correlational method was chosen for all correlations in this study as the analysis was based on a linear relationship between two continuous variables rather than ranked values, which would call for a Spearman correlational method. The data report a correlation of .029 for 2016-2017 and .052 for 2017-2018. According to Salkind (2016), this means that there is no correlation or there is a weak correlation. With a significance level set at .05, this output shows that the correlations for 2016-2017 and 2017-2018 are not significant at .847 and .731 respectively (Muijs, 2011).

Table 4.5: SCTG Tiered Fidelity Inventory (TFI) and Office Discipline Referral (ODR) Correlation Matrix

	Pearson Correlation	Sig. (2-tailed)	N
2016-2017 SCTG	.029	.847	46
2017-2018 SCTG	.052	.731	46

Note: SCTG = School Climate Transformation Grant
** Correlation is significant at the 0.05 level (2-tailed).

Figure 4.9 displays a scatterplot with a line of best fit as a visual representation of the SCTG correlational data for 2016-2017. Since the independent variable is the TFI, it is on the X (horizontal) axis. The dependent variable, ODR, is on the y (vertical) axis. Visually, the line of best fit demonstrates a fairly flat angle. This reinforces the insignificant correlational results. The r^2 (coefficient of determination) value is presented outside of the graph in the upper righthand corner. However, since the correlation was not found to be significant, this value was not analyzed.

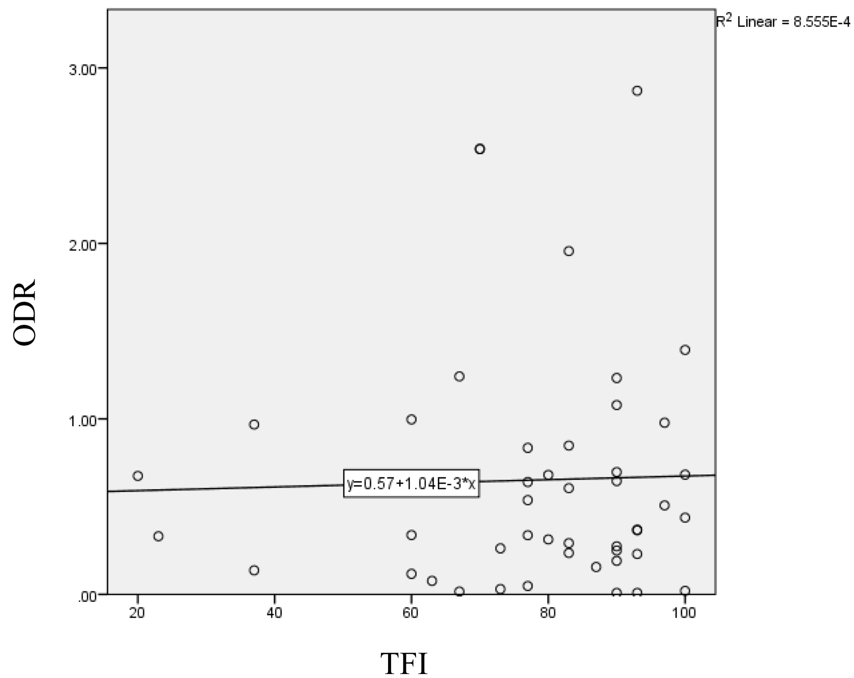


Figure 4.9: 2016-2017 School Climate Transformation Grant (SCTG) Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

Figure 4.10 displays a scatterplot with a line of best fit as a visual representation of the SCTG correlational data for 2017-2018. Again, TFI is on the X axis, and ODR is on the y axis. Visually, the line of best fit demonstrates another fairly flat angle. This reinforces the insignificant correlational results for this data set. The r^2 (coefficient of determination) value is presented outside of the graph in the upper righthand corner. However, since the correlation was not found to be significant, this value was not analyzed.

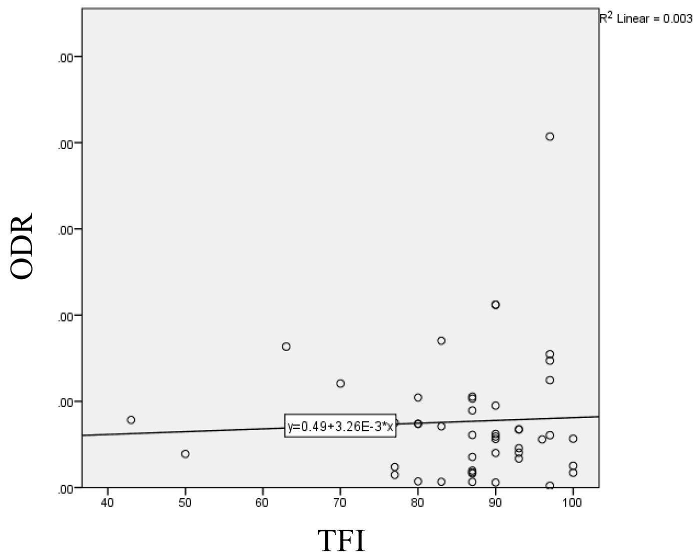


Figure 4.10: 2017-2018 School Climate Transformation Grant (SCTG) Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

The correlational analyses revealed that all correlations between the Tier 1 TFI percentage score and daily average ODRs per 100 students were not statistically significant. Discussion over why this may have happened is presented in the following chapter.

Research Question Two Findings and Analysis

The second research question in this study sought to analyze the predictive validity of stage of implementation and Tier 1 TFI percentage score on student problem behaviors as measured by ODR reported in SWIS. Using the data set provided by MIBLSI for the SCTG participating schools, a multiple regression analysis was planned to be conducted for the 2017-2018 school year only. Since stage of implementation data were only available for the 2017-2018 data, the 2016-2017 data were removed from this analysis. Again, the cohort total was forty-six schools. When analyzing the raw data set, it was discovered that there were only two stages of implementation reported: Pre-exploration/adoption and installation. Additionally, there were only three schools who were in the pre-exploration/adoption stage, leaving forty-three schools in the installation phase. The lack of diversified data in this set is cause for further interpretation of the data to analyze for collinearity. For the analyses, the independent or predictor variables were stage of implementation and Tier 1 TFI percentage score, and the dependent or criterion variable was the number of student problem behaviors as measured by ODR reported in SWIS. The equation for the multiple regression was $Y' = b_0 + b_1T_1 + b_2S_1 + \varepsilon$ (Muijs, 2011).

In order to know if the data set warrants the multiple regression analysis, it was necessary for the variables to be parsimonious and orthogonal. It was also necessary to test for linearity, homoscedasticity, multicollinearity, outliers, and residual errors. Figures 4.11 and 4.12 display scatterplots for each predictor variable with the dependent variable. Figures 4.11 and 4.12 do not display linearity for all variables. Homoscedasticity can also be interpreted using the same scatterplots. If the spread of data points is inconsistent within the charts, there is a violation of homoscedasticity. Again, Figures 4.11 and 4.12 violated the assumptions of normality and were deemed to have heteroscedasticity. Given the results of these two analyses, it was determined that the multiple regression analysis was not warranted for this data set due to the variables not being parsimonious or orthogonal. No further statistical tests were needed to determine the data's appropriateness for the analysis (Muijs, 2011).

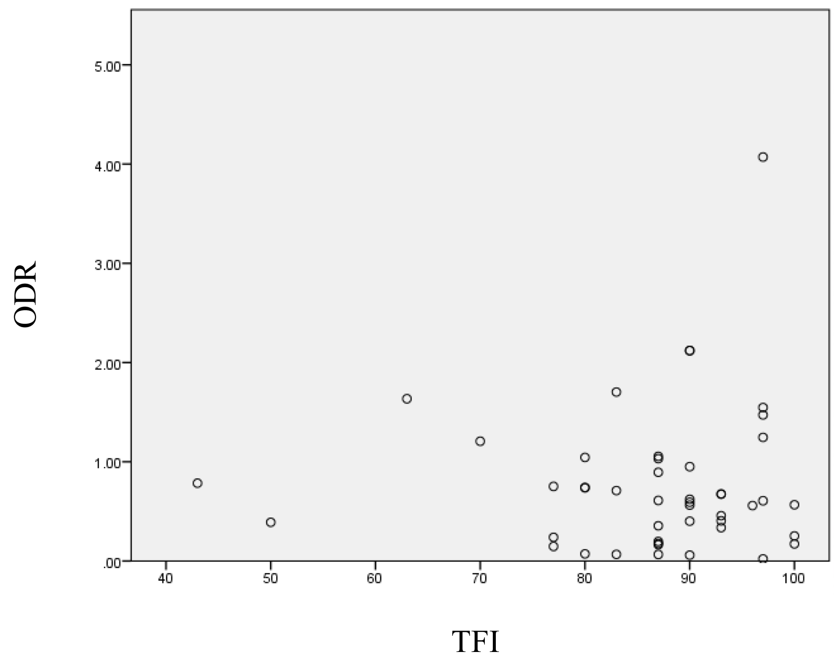


Figure 4.11: 2017-2018 School Climate Transformation Grant (SCTG) Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

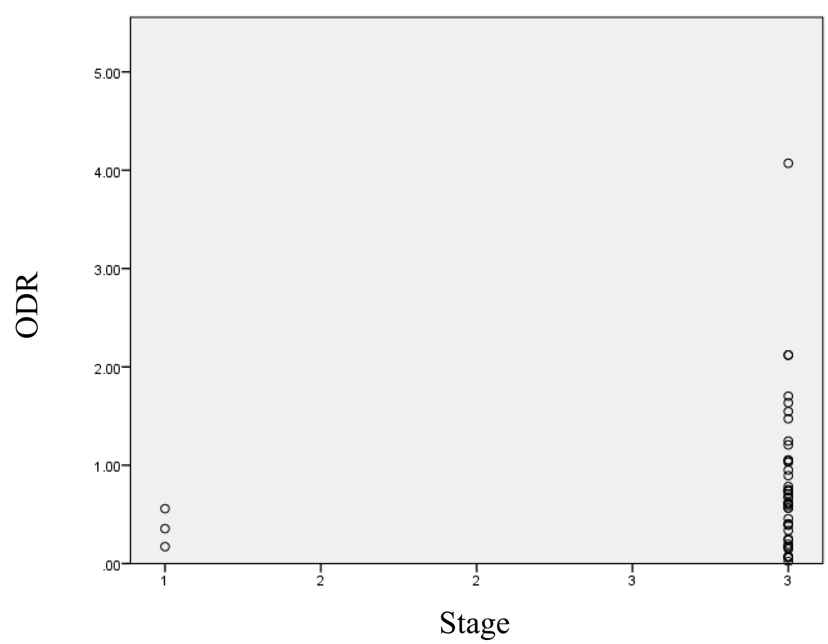


Figure 4.12: 2017-2018 School Climate Transformation Grant (SCTG) Stage of Implementation and office discipline referral (ODR) Correlation Scatterplot

Research Question Three Findings and Analysis

The third research question in this study asked if given a positive finding from question one, would there be external generalizability across the locales of city, suburb, town, and rural when PBIS is implemented with fidelity. Using the data set provided by MIBLSI for the SCTG participating schools, correlational procedures were conducted for both 2016-2017 and 2017-2018 school years for the first research question. The results of these analyses were somewhat mixed, but the overall results did not show statistical significance. Given the overall findings for the correlations conducted in question one, the analyses for question three was deemed to be unwarranted (Muijs, 2011).

In an effort to begin to analyze for generalizability of PBIS outcomes without being able to conduct the planned analysis for research question three, correlational procedures were conducted for both 2016-2017 and 2017-2018 school years for three of the four locale subgroups (suburb, town, and rural) using the data set provided by MIBLSI for the SCTG participating schools. The city subgroup was not analyzed as there was only one school reported in this group.

Table 4.6 displays a correlational matrix based upon Pearson correlation output files from SPSS for the locales of suburb, town, and rural for 2016-2017 and 2017-2018. Again, the Pearson correlational method was chosen for these correlations as the analysis was based on a linear relationship between two continuous variables rather than ranked values, which would call for a Spearman correlational method. Data is provided for the Pearson correlation coefficient, significance, and sample size. The sample size for both years for suburb is 23, for town is 9, and for rural is 13. The 2016-2017 correlation coefficient data for suburb and rural are both considered absent or weak, while the 2016-2017 correlation coefficient for town is considered weak to moderate at .398. The 2017-2018 correlation coefficient data for suburb and town shows a moderate correlation with values at -.521 and .530 respectively. The 2017-2018 correlation coefficient for rural is considered weak at -.227. With a significance level set at .05, the 2016-2017 outputs for all locales show that their correlations were not significant, ranging from .289 to .654. The 2017-2018 outputs for town and rural show that their correlations were not significant, ranging from .142 and .456 respectively. However, the significance value for 2017-2018 suburb was .011, meaning that this correlation was considered statistically significant (Muijs, 2011).

Table 4.6: Locale Tiered Fidelity Inventory (TFI) and Office Discipline Referral (ODR) Correlation Matrix

	Pearson Correlation	Sig. (2-tailed)	N
2016-2017 Suburb	-.179	.414	23
2016-2017 Town	.398	.289	9
2016-2017 Rural	-.138	.654	13
2017-2018 Suburb	-.521**	.011	23
2017-2018 Town	.530	.142	9
2017-2018 Rural	-.227	.456	13

** Correlation is significant at the 0.05 level (2-tailed).

Table 4.7 displays *t* tests for the 2016-2017 and 2017-2018 locale ODR data as the sample sizes for these subgroups were below thirty. The data were analyzed to determine if the disaggregated data approximated the full SCTG data set. The significance values reported in Table 4.7 for the locales of suburb and town for both 2016-2017 and 2017-2018 were all above .05. This means that the suburb and town samples for the 2016-2017 and 2017-2018 data do not approximate the larger population of the 2016-2017 and 2017-2018 SCTG data sets. However, the significance values reported for both 2016-2017 and 2017-2018 rural data were both below .05 (.002 and .009 respectively), meaning that the ODR data for the rural locale do approximate the larger population of the SCTG 2016-2107 and 2017-2018 ODR data.

Table 4.7: 2016-2017 Locale ODR One-Sample Test

	Test Value = .65						
						95% Confidence Interval of the Difference	
	Test Value	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
2016-2017 Suburb	.65	-.839	22	.410	.08630	-.2996	.1269
2016-2017 Town	.65	1.785	8	.112	.65478	-.1911	1.5007
2016-2017 Rural	.65	-3.856	12	.002	-.26985	-.4223	-.1174
2017-2018 Suburb	.77	-1.399	22	.176	-.13248	-.3288	.0639
2017-2018 Town	.77	2.042	8	.075	.78556	-.1016	1.6728
2017-2018 Rural	.77	-3.101	12	.009	-.30885	-.5259	-.0918

Note: ODR = Office Discipline Referrals

Figure 4.13 displays a scatterplot with a line of best fit as a visual representation of the Suburb cohort correlational data for 2016-2017. As with the SCTG scatterplots, TFI is on the X axis, and ODR is on the y axis. Visually, the line of best fit demonstrates a downward angle, representing a slight negative correlation. The r^2 (coefficient of determination) value is presented outside of the graph in the upper righthand corner. However, since the correlation was not found to be significant, this value was not analyzed.

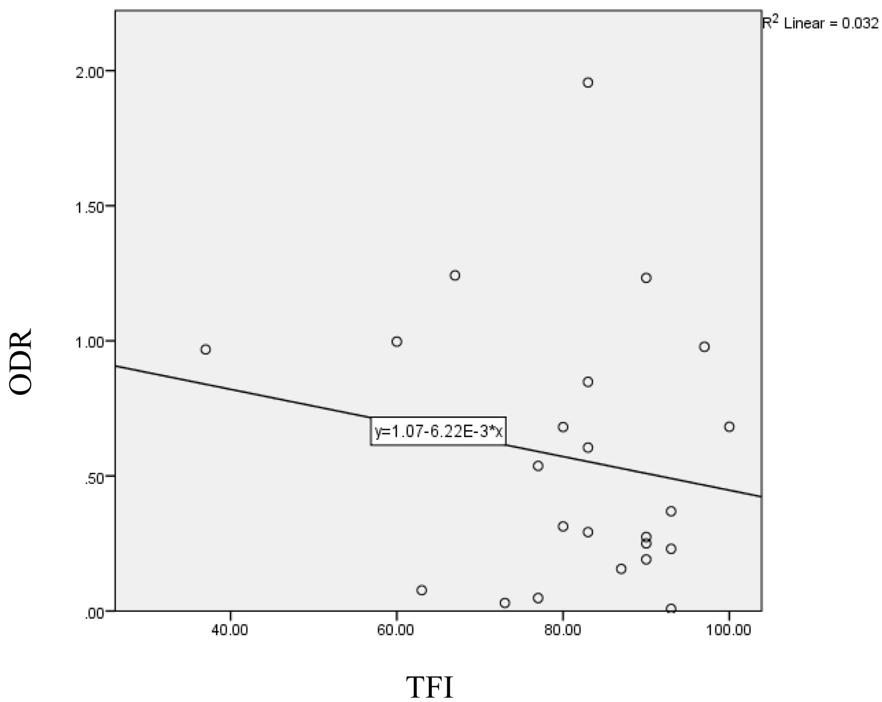


Figure 4.13: 2016-2017 Suburb Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

Figure 4.14 displays a scatterplot with a line of best fit as a visual representation of the suburb cohort correlational data for 2017-2018. Again, TFI is on the X axis, and ODR is on the y axis. Visually, the line of best fit demonstrates a downward angle, representing a negative correlation. The r^2 (coefficient of determination) value presented outside of the graph in the upper righthand corner is .272. This value is moderate, meaning that every one unit of increase in TFI explains a 27.2% of ODR. This also means that as TFI scores increase, there is a decrease in the number of ODRs for these schools (Salkind, 2016).

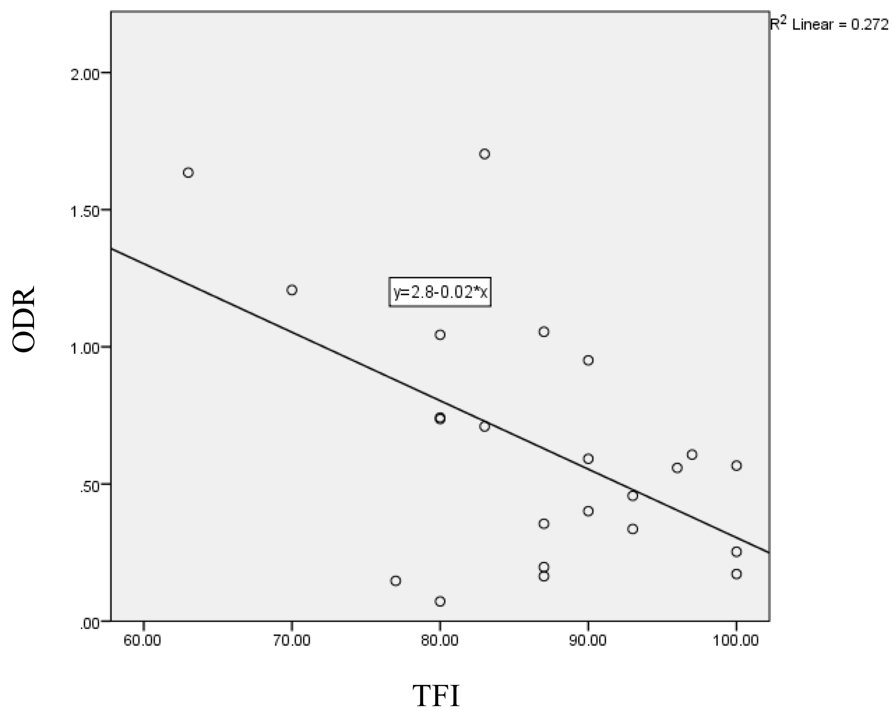


Figure 4.14: 2017-2018 Suburb Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

Figure 4.15 displays a scatterplot with a line of best fit as a visual representation of the town cohort correlational data for 2016-2017. As with all other scatterplots presented, TFI is on the X axis, and ODR is on the y axis. Visually, the line of best fit demonstrates an upward angle, representing a positive correlation. The r^2 (coefficient of determination) value is presented outside of the graph in the upper righthand corner. However, since the correlation was not found to be significant, this value was not analyzed.

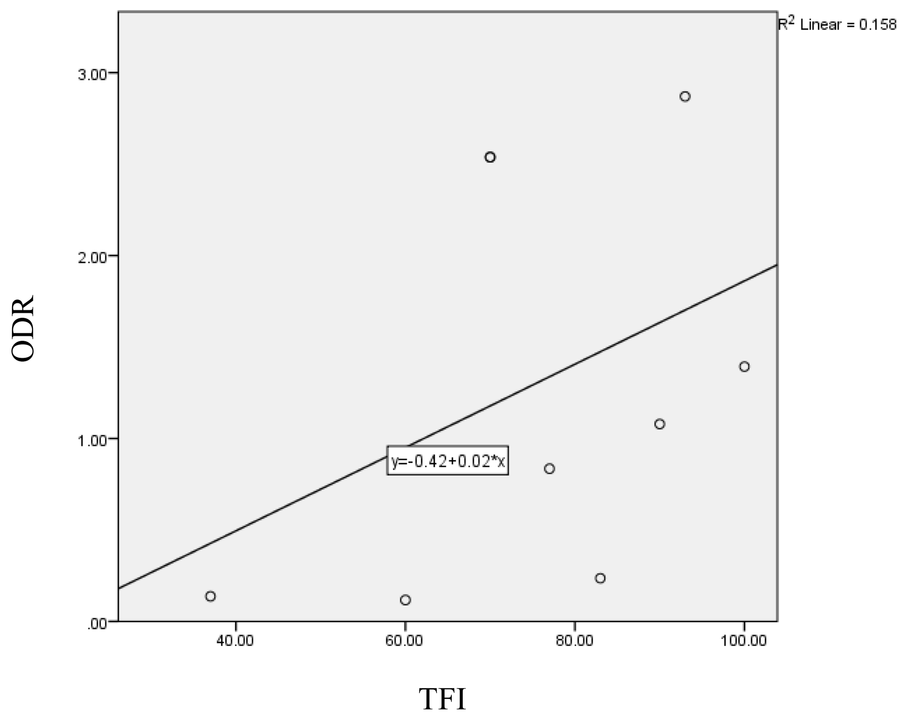


Figure 4.15: 2016-2017 Town Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

Figure 4.16 displays a scatterplot with a line of best fit as a visual representation of the town cohort correlational data for 2017-2018. As with all other scatterplots presented, TFI is on the X axis, and ODR is on the y axis. Visually, the line of best fit demonstrates an upward angle, representing a positive correlation. The r^2 (coefficient of determination) value is presented outside of the graph in the upper righthand corner. However, since the correlation was not found to be significant, this value was not analyzed.

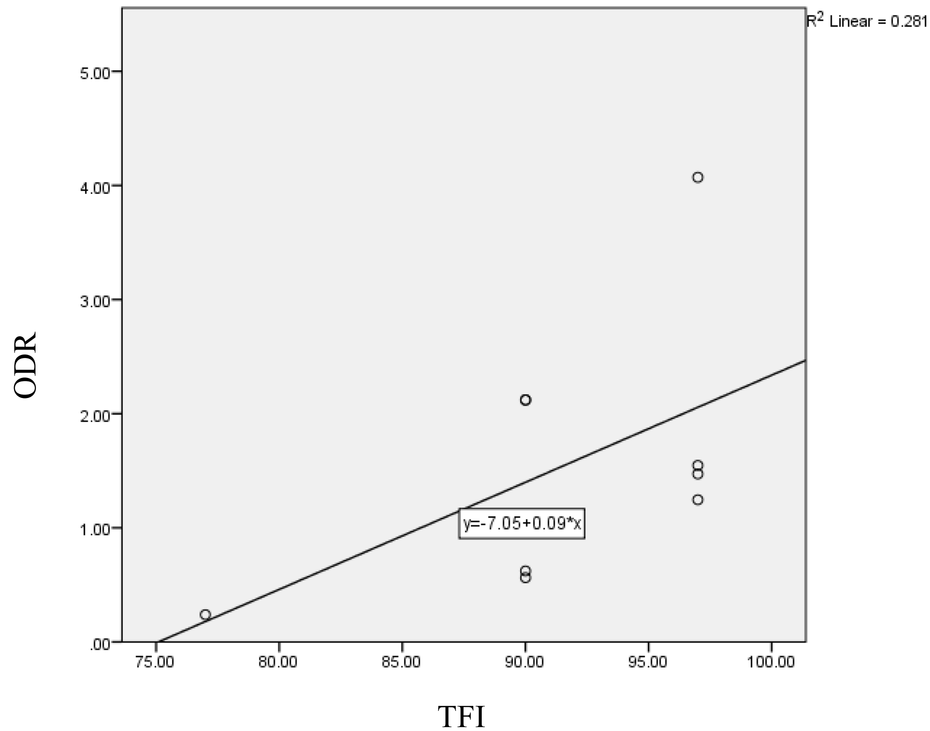
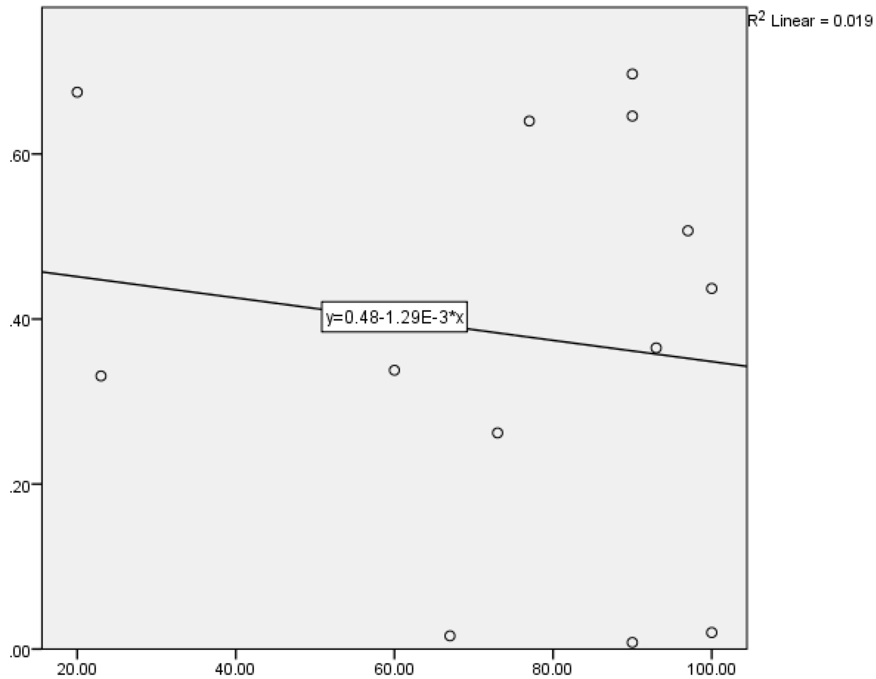


Figure 4.16: 2017-2018 Town Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

Figure 4.17 displays a scatterplot with a line of best fit as a visual representation of the rural cohort correlational data for 2016-2017. As with all other scatterplots presented, TFI is on the X axis, and ODR is on the y axis. Visually, the line of best fit demonstrates a slight downward angle, representing a slight negative correlation. The r^2 (coefficient of determination) value presented outside of the graph in the upper righthand corner is .019. This value means that TFI explains 1.9% of ODR. This also means that as TFI scores increase, there is a slight decrease in the number of ODRs for these schools (Salkind, 2016).



TFI

Figure 4.17: 2016-2017 Rural Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

Figure 4.18 displays a scatterplot with a line of best fit as a visual representation of the rural cohort correlational data for 2017-2018. As with all other scatterplots presented, TFI is on the X axis, and ODR is on the y axis. Visually, the line of best fit demonstrates a slight downward angle, representing a slight negative correlation. The r^2 (coefficient of determination) value presented outside of the graph in the upper righthand corner is .052. This value means that TFI explains 5.2% of ODR. This also means that as TFI scores increase, there is a slight decrease in the number of ODRs for these schools (Salkind, 2016).

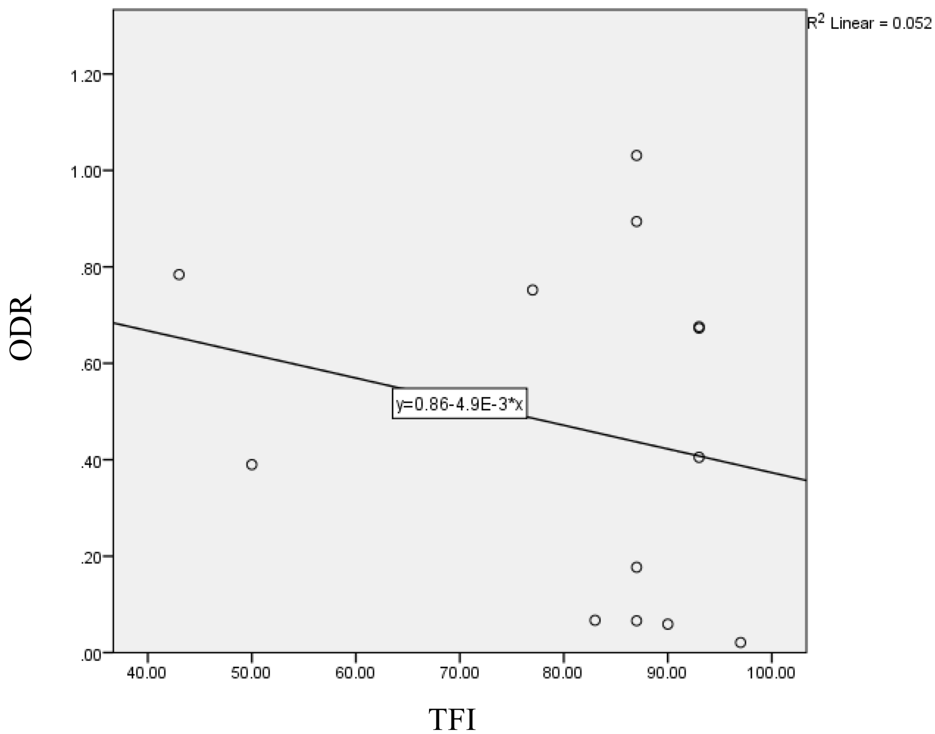


Figure 4.18: 2017-2018 Rural Tiered Fidelity Inventory (TFI) and office discipline referral (ODR) Correlation Scatterplot

The correlational analyses revealed that all but one correlation between the Tier 1 TFI percentage score and daily average ODRs per 100 students were not statistically significant. The only correlation that was significant was for the 2017-2018 suburb cohort of schools. This negative correlation demonstrated a statistically significant, moderate association between Tier 1 TFI percentage score and daily average ODRs per 100 students, meaning that as the TFI percentage increased, ODRs decreased. This finding is what was predicted based upon the reviewed literature. However, since it is the only cohort displaying this finding, there is a need for further discussion around why this happened. This discussion will follow in the next chapter.

Chapter Summary

This chapter has provided a descriptive statistical analysis of the data set supplied by MIBLSI for the SCTG participating schools. The descriptive statistics revealed significant findings around the SCTG data set in that the average TFI scores were above the 70% threshold for fidelity, and their daily average ODRs were below the national average. Correlational data were analyzed for question one for the full data set for both the 2016-2017 and 2017-2018 years. The findings of the correlations were not statistically significant. Additionally, statistical procedures were conducted to determine if a multiple regression analysis was warranted for research question two. It was determined that the multiple regression analysis was not warranted given the results of the tests for linearity and homoscedasticity. Finally, a justification for the unwarranted analyses for research question three was provided stating that the lack of statistically significant results for question one made question three unanswerable. In an effort to begin to address question three, correlational data were analyzed for the four locales of city, suburb, town, and rural. The findings of the correlations were not statistically significant with the exception of the correlation for the 2017-2018 suburb data.

CHAPTER FIVE

CONCLUSION

This study analyzed the association between the implementation of Tier 1 Positive Behavioral Interventions and Supports (PBIS) as measured through Tier 1 Tiered Fidelity Inventory (TFI) and the rate of student problem behaviors as measured through office discipline referrals (ODRs). Secondly, the study aimed to examine the predictive validity of Tier 1 TFI and stage of implementation on student problem behaviors as measured by ODRs. Finally, this study aimed to examine the generalizability of positive outcomes across groups of schools labeled as city, suburb, town, and rural. The unit of analysis of this study was at the school level. The study focused on schools within the state of Michigan who were partnering with Michigan's Integrated Behavior and Learning Support Initiative's (MIBLSI) School Climate Transformation Grant (SCTG) participating schools. This conclusion chapter will include the following sections: summary of findings, limitations, and recommendations for future research.

Discussion

A descriptive statistical analysis was conducted for the daily average ODRs per 100 students for 2016-2017 and 2017-2018 as reported in the School-Wide Information System (SWIS) for both the SCTG data set as well as the national SWIS data set. Before comparing the two data set's results, it is important to note that the data set from the national SWIS Summary Report (see Appendix G) is from a sample of schools that does not include data on their level of implementation fidelity. For the SCTG data set, the level of implementation fidelity is included based on each school's reported TFI percentage score. While the implementation fidelity for the national sample may or may not vary widely, the implementation fidelity for the SCTG participating schools is from schools where a majority had reached or surpassed the 70% fidelity threshold identified for the TFI (Mercer, McIntosh, & Hoselton, 2017; Massar et al., in press 2017). In fact, for the 2016-2017 school year, thirty-five of the forty-six (76.08%) schools in the MIBLSI SCTG data set were at or above the 70% threshold on the TFI, with forty-two of forty-six (91.3%) being at 60% are higher. In 2017-2018, forty-three of the same forty-six (93.47%) schools were at or above the 70% threshold, leaving only three (6.52%) schools not reaching fidelity in the sample. These findings align with expected outcomes in research conducted around the 70% fidelity threshold by Mercer et al. (2017). Research conducted by Mercer et al. (2017) found that positive outcomes are realized once a school reaches this threshold. When comparing the data from the national SWIS data set to the SCTG data set in this study, the SCTG data set is consistently below the national mean for the average daily ODRs reported for both 2016-2017 and 2017-2018. Since almost all of the SCTG participating schools are at or above the 70% fidelity threshold and are consistently below the national mean for average daily ODRs per 100 students, the results of the descriptive analyses fall in line with Mercer et al. (2017) research stating that schools implementing at or above the 70% threshold on the TFI are likely to realize positive student outcomes.

Although not all assumptions were met for the data set regarding research question one, robust statistical analysis of the correlations were conducted with the results being interpreted with caution. Analysis and findings around research question one revealed weak and insignificant associations between TFI and ODRs for SCTG data set. Since the data set did not meet all assumptions of normality for the correlation, the null hypothesis is accepted only with caution. Even though the null hypothesis is being accepted with caution, it is possible that there are positive effects from this study that could not be discovered due to the limitations encountered. While this outcome was not predicted, it is not new in PBIS research. As leaders in implementation science research, Fixsen, Naoom, Blasé, Friedman, and Wallace (2005) found that there has been little research done around the impact time has on realizing positive outcomes when evidence-based practices are implemented. They suggest that extensive planning efforts must be done in order to conduct research to confirm the significance time implementing plays on realizing positive outcomes. More recently, a study conducted by Gage, Grasley-Boy, Peshak George, Childs, and Kincaid (2018) found that schools who had been implementing PBIS for three to five years showed statistically significant results in relation to a reduction in ODRs. The results for schools implementing for one to two years and six to ten years did not show statistically significant results. While the research conducted by Gage et al. (2018) is not confirmed by the results of this study, their research provides a lens to interpret this study's findings. This study's data set does not include information on the number of years that schools have been implementing PBIS. The amount of time that schools have been implementing PBIS could vary widely, as some schools may have started implementing prior to partnering with the SCTG project. Additionally, given that this study is looking at data over two consecutive years of implementation under the SCTG project (years three and four of the SCTG funding cycle), it is possible that the schools did not begin implementing at the beginning of the grant funding cycle and have not yet been implementing long enough to realize positive outcomes for ODR rates. This adds to what other studies have found around the effects of PBIS implementation on student outcomes, making this study a replication of other studies. Given that the stages of implementation do not align with the length of time implementing, and without information directly from the schools around their length of time implementing, this variable is unable to be analyzed. Most importantly, given that this funding source was in its final year and was up for review around the possibility of funding for another five years, the timing of this study was critical to informing funding decisions. One of the main implications of this finding is that these schools need more time implementing PBIS in order to realize positive outcomes in relation to ODRs. Educational leaders including government policy makers and funders, school and district administrators, and teacher leaders need to understand that the positive effects of implementation take time to come to fruition.

Research question two was unable to be answered. When testing the stage of implementation variable for linearity and homoscedasticity, it was discovered that running the multiple regression analysis would be in violation of the assumptions of normality. According to Muijs (2011), statistical analyses must be conducted to determine if a multiple regression analysis is appropriate for a given data set. These analyses include test for linearity, homoscedasticity, multicollinearity, outliers, and residual errors. These tests quickly revealed that a multiple regression was not justified due to a lack of linearity and homoscedasticity and the study’s variables not being parsimonious or orthogonal. The largest limitation, which will be discussed in depth in the limitations section of this chapter, was the lack of variability in the stage of implementation data. The original plan for this analysis was based on the presumption that schools would fall into most, if not all, of the six stages of implementation identified by MIBLSI’s Stages of Implementation Indicators document (see Appendix E). However, only two stages of implementation are represented across the forty-six schools included in the data set. Only three schools reported being at the Pre-Exploration/Adoption phase, and forty-three schools reported being in the Installation phase. The lack of variability in data points for this variable led to a lack of linearity and homoscedasticity in the data. For this reason, there were not significant findings for research question two; however, there is needed discussion around limitations as well as implications for future research that will be discussed in the next two sections of this chapter.

Finally, research question three was unable to be addressed due to the findings in research question one not being significant. This means that generalizability was unable to be explored in this study. However, the analyses of the correlations for the locales revealed additional information. The suburb data set was the only one where moderate associations were found between TFI and ODRs with 2017-2018 data, which was also reported as statistically significant. Additionally, the negative correlations between TFI and ODRs demonstrated with the suburb data set are what the research says should happen when PBIS is implemented with fidelity (Bradshaw et al., 20l0 Horner et al, 2009; Safran & Oswald, 2003). This means that for the suburb cohort of schools, student problem behaviors as reported in SWIS by daily average number of ODRs per 100 students declined as Tier 1 TFI percentage scores increased. These patterns were not demonstrated across the SCTG data set or the other subsets of locales: city, town, or rural. Again, as with research question two, there is needed discussion around limitations as well as implications for future research regarding external generalizability of PBIS outcomes in the locales of city, suburb, town, and rural. These limitations will be discussed in the next two sections of this chapter.

Limitations

As with most research, limitations exist within this study. There were specifically five main limitations within the data set: lack of information around time implementing; lack of multiple data points around stage of implementation; small sample sizes for the four locales of city, suburb, town, and rural; access to schools for additional data, which limited the study from using qualitative data; and violations of assumptions for the data set.

One of the main limitations in this study was the amount of longitudinal data available as well as specific information around how long schools had been implementing PBIS prior to partnering with the SCTG project. Since the SCTG was the only MIBLSI project with a data set specific to PBIS implementation and not including confounding variables related to academics, there was a lack of data for schools partnering with MIBLSI for more than two years. Additionally, schools did not disclose their level of implementation of PBIS prior to partnering. This meant that the amount of data that was able to be collected while still representing an appropriate sample size only represented their two years of partnership with the SCTG project. This can lead to non-significant results simply due to the length of time the schools have been implementing. Research has shown that the length of time dedicated to implementation is a contributing factor in realizing positive results (Bradshaw et al., 2010; Childs et al., 2015; Gage et al., 2018). In fact, research has found that the number of ODRs reported in SWIS tends to rise within the first year of implementation possibly due to factors such as the school staff becoming more accurate in their data collection or the awareness of problem behavior definitions increasing (Childs et al., 2015). Some research has determined that results from other indicators such as number of suspensions, number of expulsions, behavior screening, or attendance are additional indicators of success in the beginning stages or years of PBIS implementation (Childs et al., 2015; Gage et al., 2018). These indicators were not able to be included in this study's examination of outcomes as they were not able to be mined from the MIBLSI data warehouse. For this reason, this study focused on ODRs as the primary outcomes for analysis. As previously mentioned, recent research suggests that it can take three to five years before schools see a decrease in the number of ODRs as a result of implementing evidence-based practices with fidelity within their PBIS framework (Gage et al., 2018).

Another major limitation of this study was the lack of multiple data points around stage of implementation. This occurred for couple of reasons. The first reason this data point was limited was that the MIBLSI data system does not keep record of stages of implementation as schools progress. They only house the record of the current, real-time stage of implementation, which only allows data to be collected and analyzed in real-time rather than over a period of time. For this reason, the current study was only able to analyze the stage of implementation from the spring of 2018 to ensure that the data aligned with the TFI results from the same time period. Due to this constraint and the fact that the data were being analyzed for one, short term grant cohort, all but three of the forty-six schools reported being in the same stage of implementation. Since these schools have been moving along in a similar scoped and sequenced training and technical assistance model, their lack of variability in implementation stages is reasonable. In discussion around the parameters of this study, the MIBLSI research director stated that the project would benefit from further analyses around stage of implementation. A change in how data will be archived could become a future work assignment for their technical team (A. Harms, personal communication, March 20, 2018).

Limitations also existed in the study around the sample size for different locales. Since the data set was confined to one grant project within one state, there were only forty-six schools represented in the overall sample. When disaggregating the sample into the four locales of city, suburb, town, and rural, it was reasonable to find that the sample sizes were limited. In fact, only one school (2%) was labeled as city, twenty-three schools (50%) were labeled as suburb, nine schools (20%) were labeled as town, and thirteen schools (28%) were labeled as rural. Because of the limited sizes of these cohorts, analyses could not be conducted around the city cohort, and the other locales required additional hypothesis testing to ensure that their sample approximated the larger population. In these analyses, it was found that the only locale that did approximate the larger population for ODRs in 2016-2017 and 2017-2018 was the rural subgroup; however, this correlation was not significant, making this finding irrelevant. The lack of approximation for the suburb and town locales makes their results unreliable and leads to a need for additional research to be conducted around these data points. With an expanded data set, one could ask if positive PBIS outcomes could be generalized across locales.

Limitations were also present in this study around access to the schools represented in the data. MIBLSI has a specific data sharing agreement with their partnering districts and schools (see Appendix H). Outside researchers or other interested partners who are not a part of the state department of education, an intermediate school district, a local district, or a school who has access in MIBLSI's database are not able to access identifiable data. All research for this study was done under a research agreement with MIBLSI that allowed data to be accessed in an unidentified, secure data file. Due to this limitation, qualitative methods could not be used. Put simply, this limitation prevented the researcher from entering the setting of these schools, sampling purposefully and strategically key practitioners, and ascertaining from their professional view whether or not PBIS implementation fidelity caused a decline in ODRs.

Through the use of interviews, focus groups, and surveys, one could collect data around the context of PBIS implementation in order to further analyze fidelity and outcomes.

Finally, limitations existed in this study around the data set in general. This limitation began with the data set not being accessible early on in the research process. Without advanced knowledge of the parameters and quality of the data set, it was unknown if the data set would meet the assumptions of normality. With analysis around the assumptions of normality demonstrating violations in linearity and homoscedasticity, results of this study must be interpreted with caution. While the null results are aligned with schools at the 70% threshold on Tier 1 of the TFI (Mercer et al., 2017) and null effects in early years of implementation (Gage et al., 2018), this study was unable to access variability in level of implementation or control for years of implementation data to confirm these findings. Rather, research conducted by Mercer et al. (2017) and Gage et al. (2018) offers a lens of explaining the possible null effects found in this study. Due to these limitations, there could be effects within the SCTG participating schools, but they were not able to be discerned in this study. Additionally, given that this is a state level data set, the data was meant to be analyzed from a systems viewpoint rather than from a detailed outcome viewpoint. One of the limitations of state level data is that it is not always collected at a disaggregated level, which allows for a more detailed look at the effects of implementation. With a data set that is already disaggregated, it would be possible to analyze the specific effects of PBIS implementation on student outcomes.

Recommendations for Future Research

One of the limitations of this study was that the SCTG data set only contained data from two years of implementation. With research pointing toward a need for at least three to five years of implementation in order for desired results to be realized (Gage et al., 2018), it would benefit the field to revisit this study's methodological plan with schools who have been implementing PBIS for five years or more. Additionally, given that the Michigan's Department of Education was just awarded funding in the second round of the SCTG competition, there is potential that existing SCTG participating schools could continue to receive supports around PBIS implementation. If so, additional research around the effects of long-term implementation would benefit the field as well as local, state, and national leaders as they determine next steps for budgets, competitive grants, and policies affecting education.

As for MIBLSI's data collection procedures, it would benefit the organization to collect archived stage of implementation data as well as disaggregated ODR data. MIBLSI's current practice of only collecting stage of implementation in real-time does not allow the data to be analyzed overtime. By archiving stage of implementation data, research could be conducted around the predictive validity of stage of PBIS implementation on positive outcomes. Additionally, MIBLSI could collect disaggregated ODR data based upon offense in order to determine if PBIS implementation is reducing specific offenses as schools work toward implementation fidelity. Given that research has shown that data collection for ODRs increases and becomes more accurate at the beginning of implementation efforts (Childs et al., 2015; Gage et al., 2018), this data could provide a detailed look at the effects of PBIS on student behaviors.

Another recommendation for future research is to analyze the effects of PBIS implementation on additional outcome measures such as suspensions, expulsions, school climate and safety perception data, attendance, GPA, course failures, staff interviews, observations, and behavior screening. This could require an explanatory mixed methods study or a case study wherein the researcher was able to access specific school staff, additional data points housed in the school's student data warehouse, and detailed information about the context of the school. Findings from these qualitative methods would support and confirm the factors that could explain positive outcomes in earlier years of implementation (Childs et al., 2015; Gage et al., 2018). These data points could also provide a more holistic view of the effects of PBIS implementation on the whole child rather than just analyzing externally manifested behavioral problems that appear in ODRs.

A final recommendation would be to access a larger data set so as to obtain a large sample size for different locales. With a need to generalize positive PBIS outcomes across different demographic regions, a larger sample size would assist future research studies to approximate a normal distribution, thus creating a more reliable analysis. One way in which this could be done is to pull data from MIBLSI around one year of data so as to increase the sample size. The current study's data set is a collection of data over two years, which required that all schools in the data set had been collecting data consistently over a specific time period. Schools where the full two years of data were not present were removed from the data set. By only looking at one year of data, additional schools could be added to the overall data set, possibly increasing the sample size for each locale. Furthermore, when eliminating the need for two years of data as well as the need for stages of implementation (which are only entered for their partnering schools), the sample size could increase drastically. Another option to increase sample size would be to contact the University of Oregon to get national data since this institution houses the PBISApps data system. This system houses national ODR data in SWIS as well as PBIS assessment data, including the TFI. A research partnership at a national level would certainly include a larger sample size; however, it would need to be determined if this institution could pull data with locale identifiers. A final option to increase sample size would be to contact a state agency outside of Michigan where PBIS is supported on a large-scale basis. Possible states to contact would include Florida, Minnesota, Colorado, and Oregon. Again, there would be a need to identify which types of data are collected and available prior to designing the research study.

Chapter Summary

This chapter has summarized the key findings of this study and has provided a detailed discussion around these findings. Findings were summarized with key implications for the field as well as current supporting research. Findings for research question one revealed primarily null effects between the PBIS TFI Tier 1 percentage score and student problem behaviors as measured by ODRs reported in SWIS. There were no findings for research question two as the variables were found to not be parsimonious or orthogonal and did not pass tests for linearity and homoscedasticity. Finally, research question three was unable to be answered due to a lack of positive findings in research question one. However, research was done to analyze correlations across locales, finding statistically significant results for the 2017-2018 suburb data set. In addition, this chapter also provided limitations to this study including limitations to the data set, limitations around length of time implementing, and limitations around sample size. Finally, this chapter made recommendations around future research in this area in order to address the limitations of the study and to provide the educational field with additional research around the effectiveness of PBIS.

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Appendix A
Institutional Review Board Approval Letter

UNIVERSITY OF MICHIGAN
eResearch.umich.edu

Flint Institutional Review Board • 530 French Hall, 303 E. Kearsley St, Flint, MI 48502 • phone (810) 762-3383 • fax (313) 593-0526 • research@umflint.edu

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To: Amy Henry
From:
Kazuko Hiramatsu
Cc:
Amy Henry
Tyrone Bynoe
Subject: Notice of Determination of "Not Regulated" Status for [HUM00146886]
SUBMISSION INFORMATION:
Title: Positive Behavioral Interventions and Supports Implementation and Student Problem Behaviors: A Multiple Regression Analysis
Full Study Title (if applicable): Positive Behavioral Interventions and Supports Implementation and Student Problem Behaviors: A Multiple Regression Analysis
Study eResearch ID: HUM00146886
Date of this Notification from IRB: 6/3/2018
Date of IRB Not Regulated Determination: 6/3/2018

IRB NOT REGULATED STATUS:

Category	Outcome Letter Text
Research Using Publicly Available Data Sets	Based on the information provided, the proposed study falls under the University of Michigan's policy for research using publicly available data sets (http://hrpp.umich.edu/initiative/datasets.html). Under this policy and in accordance with federal regulations for human subjects research (45 CFR Part 46) IRB approval is not required as the data cannot be tracked to a human subject.
Research on Organizations	Based on the information provided, IRB approval is not required for this project, as it does not include identifiable private information about individual members, employees or staff of the organization that is the subject of the research.

Kazuko Hiramatsu
Chair, IRB Flint

Appendix B:
MIBLSI Research Partnership Application

MIBLSI

Statement of Interest for Research Partnership with MIBLSI

This document outlines procedures and information for individuals to complete if interested in partnering with MIBLSI in a research endeavor. Examples of collaboration might include accessing MIBLSI partners for research participation, analyzing de-identified project data, or researching MIBLSI's system of supports.

Author: Michigan's Integrated Behavior and Learning Support Initiative (MIBLSI)

Version: 1.0

Date: March 2018

Procedures

1. Complete this form and e-mail to Anna Harms, MIBLSI Evaluation and Research Coordinator aharms@miblsimtss.org
2. After reviewing your completed form, a MIBLSI staff member will contact you regarding next steps.
3. If there appears to be mutual benefit to a partnership, a conference call will be scheduled. Students, this initial conference call will also require the participation of your university-based advisor/supervisor.
4. For all approved partnerships, the following will be required:
5. An action plan outlining next steps and deadlines.
6. A signed letter of partnership between MIBLSI and the external research partner. The letter will describe all agreements and commitments.
7. Research partners will need to secure other formal approval to conduct research (e.g., university human subjects institutional review board, Michigan Department of Education, local school district, etc.)
8. Share research findings and discuss implications for the work of MIBLSI in one or more of the following venues: MIBLSI staff meeting, State Conference.

Contact Information

Name: Amy Henry

Title/Position: School Improvement and MTSS Consultant

Organization: Muskegon Area Intermediate School District

Address: 630 Harvey St., Muskegon, MI 49442

Phone: (517) 927-8153

Email: amyjohenry@me.com

1. Describe your knowledge of MIBLSI and any interactions/involvement you have had with the project.
   - I have worked with the MIBLSI project and project staff since 2009. I was an external coach for a building in cohort 6, and I was a member of an ISD MTSS team in District Cohort 1. I have attended all MIBLSI conferences since 2010. I have been a trainer of MIBLSI materials since 2012 and have worked closely with the project on the School Climate Transformation Grant. I have been a part of the RIT meetings when my position was at the ISD level. I have attended numerous trainings sponsored or run by MIBLSI, and I am currently supporting Muskegon Heights as they partner with MIBLSI in their turnaround efforts.
2. Describe your research interests, including 1) rationale for the study, 2) conceptual or analytic framework, 3) research questions, 4) expected contributions to the broader literature.
   1. The purpose of this study is to analyze the predictive validity of Tier 1 SWPBIS TFI percentage on student ODRs as reported in SWIS. The study will further support research around the threshold of fidelity (70%) that was identified in previous research studies. Additionally this study seeks to determine predictive validity of the stage of implementation as measured by the MIBLSI implementation indicators. Through a multiple regression analysis, the study will determine the amount of predictive validity the Tier 1 TFI score and stage of implementation have on student problem behaviors. A final and possible purpose of this study is to demonstrate that PBIS is effective in all locales (city, suburb, town, and rural). This will demonstrate generalizability of PBIS.
   2. The conceptual framework behind this study is that schools can and will see a change in desired behavioral outcomes when they teach rather than suppress student behaviors. As their implementation of the core features of PBIS increases, they will realize a decrease in ODRs.

Michigan's Integrated Behavior and Learning Support Initiative (MIBLSI) is a Grant Funded Initiative (GFI), funded under the *Individuals with Disabilities Education Act* (IDEA) through the Michigan Department of Education.

MIBLSI

3. The current research questions are as follows (will be adding an initial question to address the need for descriptive statistical analysis):
    i. Is there statistically significant predictive validity between Tier 1 School-Wide PBIS Tiered Fidelity Inventory percentage and student problem behaviors as measured by office discipline referrals reported in SWIS?
    ii. What is the extent or predictive validity of Tier 1 School-Wide PBIS Tiered Fidelity Inventory score and PBIS stage of implementation on the rate of student problem behaviors as measured by office discipline referrals reported in SWIS?
    iii. Given a positive finding in question one, is there generalizability across locales (city, suburb, town, and rural) when Tier 1 of PBIS is implemented with fidelity as measured by the School-Wide PBIS Tiered Fidelity Inventory?
4. This study would possibly confirm the threshold of fidelity (70%) of the SWPBIS TFI that has been identified in previous research. This study will also provide information regarding the predictive validity of stage of implementation on student outcomes (ODRs). Finally this study will look at locales and determine if PBIS outcomes can be generalized across these groups.

3. Describe how your research would contribute specifically to the mission of MIBLSI: *MIBLSI creates capacity for an integrated behavior and reading Multi-Tiered System of Supports that can be implemented with fidelity, is sustainable over time and utilizes data-based decision making at all levels of implementation support.*
    - This research will analyze the predictive validity of PBIS fidelity and implementation on study outcomes (ODRs). The study aligns with MIBLSIs mission in that it will add to confidence around the use of the TFI to establish systems that support student behavior. This study will analyze some of the core principles of MIBLSI – fidelity, data, and implementation.
4. On which level of implementation will your research focus? Circle, bold, or underline items in list below.
    - **School**
    - District
    - Intermediate school district
    - State
5. Why are you interested in this level of implementation?

- The schools level provides this study with data at the level of implementation of PBIS. This will allow for an analysis based upon current data systems being used across the state.

6. How do you see MIBLSI supporting your research? Describe and circle, bold, or underline items in list below
   - Access to MIBLSI staff as research participants
   - Assistance with study design
   - **Assistance with data analysis and interpretation (If you're able, I would LOVE support with this too!)**
   - MIBLSI staff participation on thesis/dissertation committee
   - **Access to MIBLSI project data**
   - Other, please describe:
7. If interested in accessing data, please note that MIBLSI project data is aggregated at the school or district level. Individual student and classroom data are not available in the MIBLSI database. All identifying information (school, district, ISD) will be removed from existing data. If applicable, indicate specific measures of interest by circling, bolding, or underlining items in the list below.
   - Reading Tiered Fidelity Inventory, Elementary-Level Edition
   - Reading Tiered Fidelity Inventory, Secondary-Level Edition
   - **SWPBIS Tiered Fidelity Inventory**
   - **Major Discipline Referrals**
   - DIBELS Next
   - Early Warning Indicators
   - Student Risk Screening Scale
   - District Capacity Assessment
   - Regional Capacity Assessment
   - Other, please describe:
     i. **PBIS Stage of Implementation**
     ii. **EEM data related to school demographics including locale and Title I status (Free and Reduced Lunch)**
8. Please indicate at least 3 dates and times over the next month when you are available for a 1.5 hour phone call/online meeting. Student researchers, this meeting will need to include your university advisor or research chair.
   - Date/Time: **Wednesday, June 13 from 8am-12pm**
   - Date/Time: **Thursday, June 14 from 8am-10pm**
   - Date/Time: **Friday, June 15 from 8am-5pm**

Appendix C
Study's Data set

School	Locale	Stage of Implementation	2017 Tier 1 TFI	2017 SWIS	2018 Tier 1 TFI	2018 SWIS
1	City	Installation	77	.38	87	.61
2	Rural	Installation	93	.37	87	.18
3	Rural	Installation	77	.64	77	.75
4	Rural	Installation	90	.70	93	.68
5	Rural	Installation	97	.51	93	.41
6	Rural	Installation	100	.43	93	.67
7	Rural	Installation	100	.02	97	.02
8	Rural	Installation	90	.01	90	.06
9	Rural	Installation	67	.02	87	.07
10	Rural	Installation	90	.65	87	1.03
11	Rural	Installation	23	.33	50	.39
12	Rural	Installation	20	.68	43	.78
13	Rural	Installation	73	.26	83	.07
14	Rural	Installation	60	.34	87	.89
15	Suburb	Installation	83	1.96	80	1.04
16	Suburb	Installation	67	1.24	83	1.70
17	Suburb	Installation	100	.68	100	.57
18	Suburb	Installation	60	1.00	90	.59
19	Suburb	Installation	80	.68	80	.74
20	Suburb	Installation	63	.08	80	.07
21	Suburb	Installation	87	.16	90	.95
22	Suburb	Pre Exploration	93	.23	100	.17
23	Suburb	Pre Exploration	93	.01	96	.56
24	Suburb	Installation	93	.37	93	.46
25	Suburb	Installation	90	.19	93	.34
26	Suburb	Installation	77	.05	87	.16
27	Suburb	Installation	90	1.23	97	.61
28	Suburb	Installation	83	.61	80	.74
29	Suburb	Installation	37	.97	63	1.64
30	Suburb	Installation	83	.29	83	.71
31	Suburb	Installation	77	.54	90	.40
32	Suburb	Pre Exploration	90	.25	87	.36
33	Suburb	Installation	97	.98	70	1.21
34	Suburb	Installation	80	.31	100	.25
35	Suburb	Installation	73	.03	87	.20
36	Suburb	Installation	90	.27	77	.15
37	Suburb	Installation	83	.85	87	1.06
38	Town	Installation	77	.84	90	.62

39	Town	Installation	90	1.08	97	1.55
40	Town	Installation	70	2.54	90	2.12
41	Town	Installation	70	2.54	90	2.12
42	Town	Installation	93	2.87	97	4.07
43	Town	Installation	60	.12	77	.24
44	Town	Installation	37	.14	90	.56
45	Town	Installation	100	1.39	97	1.47
46	Town	Installation	83	.24	97	1.25

Appendix D:
First Data set from MIBLSI

Transformed School Code	Locale	MIBLSI Stage	PPSC Stage	PBIS Stage
18	Town: Distant	Pre Exploration	Installation	Exploration/Adoption
56	Town: Distant	Pre Exploration	Installation	Exploration/Adoption
4358	Town: Distant	Pre Exploration	Installation	Exploration/Adoption
12566	Town: Distant	Pre Exploration	Installation	Exploration/Adoption
19312	Town: Distant	Exploration/Adoption	Installation	Exploration/Adoption
4446	Rural: Distant	Exploration/Adoption	Exploration/Adoption	Installation
326	Rural: Remote	Pre Exploration	Installation	Exploration/Adoption
11616	Rural: Remote	Exploration/Adoption	Installation	Exploration/Adoption
1688	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
470	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
8834	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
504	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
8212	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
6970	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
4132	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
604	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
680	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
10038	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
8310	Suburb: Midsize	Exploration/Adoption	Installation	Exploration/Adoption
760	Suburb: Midsize	Pre Exploration	Installation	Exploration/Adoption
13134	Suburb: Midsize	Exploration/Adoption	Installation	Exploration/Adoption
19068	Suburb: Midsize	Pre Exploration	Installation	Exploration/Adoption
10166	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
938	Town: Remote	Pre Exploration	Installation	Exploration/Adoption
4384	Town: Remote	Pre Exploration	Installation	Exploration/Adoption
4012	Town: Remote	Pre Exploration	Installation	Exploration/Adoption
9982	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
6258	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
26	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
6262	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
1924	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
2792	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
1068	Rural: Remote	Initial Implementation	Exploration/Adoption	Exploration/Adoption
982	Rural: Remote	Initial Implementation	Exploration/Adoption	Exploration/Adoption
11954	Rural: Distant	Pre Exploration	Pre Exploration	Installation
13280	Rural: Distant	Pre Exploration	Pre Exploration	Installation
1184	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
17740	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
6886	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
10776	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
15230	City: Large	Initial Implementation	Exploration/Adoption	Exploration/Adoption
6812	Suburb: Large	Elaboration	Exploration/Adoption	Exploration/Adoption
14636	Suburb: Large	Initial Implementation	Exploration/Adoption	Exploration/Adoption
17576	Suburb: Large	Initial Implementation	Exploration/Adoption	Exploration/Adoption
1730	Suburb: Large	Installation	Exploration/Adoption	Exploration/Adoption
2160	City: Midsize	Exploration/Adoption	Installation	Exploration/Adoption
1912	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
7072	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
3798	City: Midsize	Pre Exploration	Installation	Exploration/Adoption

2604	City: Midsize	Initial Implementation	Installation	Exploration/Adoption
6180	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
6222	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
5518	City: Midsize	Pre Exploration	Pre Exploration	Exploration/Adoption
11864	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
5304	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
3796	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
6030	City: Midsize	Initial Implementation	Installation	Exploration/Adoption
1134	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Exploration/Adoption
2478	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
7114	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Exploration/Adoption
2214	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Exploration/Adoption
2476	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
19268	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Exploration/Adoption
6856	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Exploration/Adoption
2532	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
4728	Suburb: Large	Pre Exploration	Pre Exploration	Installation
16886	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
2720	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
3698	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
4026	City: Midsize	Pre Exploration	Installation	Exploration/Adoption
17374	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
2914	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
2958	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
8650	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
1088	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
322	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
10436	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
6770	Rural: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
3054	Rural: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
3060	Rural: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
9914	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
11728	Town: Distant	Elaboration	Exploration/Adoption	Exploration/Adoption
3176	Town: Distant	Elaboration	Exploration/Adoption	Exploration/Adoption
3178	Town: Distant	Elaboration	Exploration/Adoption	Exploration/Adoption
118	Town: Distant	Elaboration	Exploration/Adoption	Exploration/Adoption
7046	Town: Distant	Elaboration	Exploration/Adoption	Exploration/Adoption
16902	Rural: Fringe	Elaboration	Exploration/Adoption	Exploration/Adoption
18822	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
18708	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
8482	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
3196	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
4762	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
3470	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
8282	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
3272	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
5834		Pre Exploration	Pre Exploration	Exploration/Adoption
18514	City: Small	Exploration/Adoption	Installation	Exploration/Adoption
19892	City: Small	Exploration/Adoption	Installation	Exploration/Adoption
15118	City: Small	Exploration/Adoption	Installation	Exploration/Adoption

1382	City: Midsize	Elaboration	Exploration/Adoption	Exploration/Adoption
1382	City: Midsize	Initial Implementation	Exploration/Adoption	Exploration/Adoption
3496	Rural: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
12786	Town: Remote	Elaboration	Exploration/Adoption	Exploration/Adoption
17080	Rural: Fringe	Elaboration	Exploration/Adoption	Exploration/Adoption
3792	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
11136	Rural: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
-34	Rural: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
4050	Rural: Remote	Initial Implementation	Exploration/Adoption	Exploration/Adoption
8262	Rural: Remote	Initial Implementation	Exploration/Adoption	Exploration/Adoption
8262	Rural: Remote	Elaboration	Exploration/Adoption	Exploration/Adoption
4128	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
12344	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
19064	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
11522	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
5688	Rural: Distant	Pre Exploration	Pre Exploration	Exploration/Adoption
8866	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
5486		Pre Exploration	Installation	Exploration/Adoption
4644	Town: Remote	Initial Implementation	Exploration/Adoption	Exploration/Adoption
4702	Rural: Distant	Exploration/Adoption	Exploration/Adoption	Installation
1050	Rural: Fringe	Exploration/Adoption	Installation	Exploration/Adoption
11490	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
5154	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
3690	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
5230	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
6070	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
5056	Suburb: Midsize	Initial Implementation	Exploration/Adoption	Exploration/Adoption
12690	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
8542	Town: Distant	Pre Exploration	Installation	Exploration/Adoption
5340	Town: Distant	Pre Exploration	Installation	Exploration/Adoption
17106	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
5512	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
12196	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
11214	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
5896	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
5952	Rural: Distant	Exploration/Adoption	Exploration/Adoption	Installation
5244	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
6144	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
2696	Suburb: Small	Exploration/Adoption	Installation	Exploration/Adoption
3962	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
2508	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
8284	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
6148	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
6146	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
3508	Suburb: Small	Exploration/Adoption	Installation	Exploration/Adoption
1402	Suburb: Small	Exploration/Adoption	Installation	Exploration/Adoption
8438	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
5040	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption
13514	Suburb: Small	Pre Exploration	Installation	Exploration/Adoption

4030	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
6534	Suburb: Small	Exploration/Adoption	Installation	Exploration/Adoption
9140	Suburb: Small	Exploration/Adoption	Installation	Exploration/Adoption
13138	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
6160	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
12584	Town: Distant	Exploration/Adoption	Exploration/Adoption	Exploration/Adoption
6166	Town: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
3984	City: Small	Pre Exploration	Installation	Exploration/Adoption
7028	City: Small	Pre Exploration	Installation	Exploration/Adoption
15098	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
6776	Rural: Distant	Elaboration	Exploration/Adoption	Exploration/Adoption
11380	Town: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
6462	Rural: Fringe	Initial Implementation	Exploration/Adoption	Exploration/Adoption
8186	Suburb: Large	Initial Implementation	Installation	Exploration/Adoption
8184	Suburb: Large	Initial Implementation	Installation	Exploration/Adoption
5344	Town: Remote	Installation	Exploration/Adoption	Installation
12508	Town: Fringe	Exploration/Adoption	Exploration/Adoption	Exploration/Adoption
6826	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
9782	Rural: Distant	Initial Implementation	Exploration/Adoption	Exploration/Adoption
6118	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Installation
5016	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Installation
11334	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Installation
10134	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Installation
9078	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Installation
8768	Suburb: Large	Exploration/Adoption	Exploration/Adoption	Installation
8770	Suburb: Large	Pre Exploration	Pre Exploration	Installation
3794	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
12434	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
3050	Suburb: Large	Pre Exploration	Pre Exploration	Exploration/Adoption
11820	Suburb: Large	Exploration/Adoption	Installation	Exploration/Adoption
18286	Rural: Distant	Pre Exploration	Installation	Exploration/Adoption
16078	Town: Fringe	Pre Exploration	Installation	Exploration/Adoption
8980	Town: Fringe	Pre Exploration	Installation	Exploration/Adoption
8984	Rural: Fringe	Pre Exploration	Installation	Exploration/Adoption
8982	Town: Fringe	Pre Exploration	Installation	Exploration/Adoption
12276	Suburb: Large	Pre Exploration	Installation	Exploration/Adoption
14552	Rural: Fringe	Pre Exploration	Pre Exploration	Installation

School Cohorts	Total Score	T1 Total	T1 Teams	T1 Implementation	T1 Evaluation
SCTG.S.2016	41	77	100	72	75
SCTG.S.2016	49	90	100	83	100
SCTG.S.2016	50	83	100	72	100
SCTG.S.2016	50	97	100	94	100
SCTG.S.2016	80	97	100	94	100
PBIS.S.2017a	27	27	100	83	62
SCTG.S.2016	19	43	50	33	62
SCTG.S.2016	23	50	50	50	50
SCTG.S.2017	11	33	50	33	25
SCTG.S.2017	17	50	50	67	12
SCTG.S.2015	79	100	100	89	75
SCTG.S.2015	84	100	100	100	100
SCTG.S.2015	92	90	100	83	100
SCTG.S.2015	93	93	75	94	100
SCTG.S.2015	80	80	50	89	75
SCTG.S.2015	50	87	50	94	88
SCTG.S.2016	53	73	100	72	62
SCTG.S.2016	59	87	100	78	100
SCTG.S.2015	23	67	50	67	75
SCTG.S.2015	44	73	75	78	62
SCTG.S.2015	58	93	75	94	100
SCTG.S.2015	66	97	100	100	88
SCTG.S.2017	60	67	75	72	50
SCTG.S.2015	73	90	100	83	100
SCTG.S.2015	77	90	75	94	88
SCTG.S.2015	83	97	100	94	100
SCTG.S.2015	33	80	25	89	88
SCTG.S.2015	68	87	75	89	88
SCTG.S.2015	83	90	100	89	88
SCTG.S.2015	89	97	100	94	100
SCTG.S.2015	91	100	100	100	100
SCTG.S.2015	93	96	75	100	100
S.2014	27	50	25	44	75
S.2014	40	50	25	56	50
PBIS.S.2016b	44	80	75	78	88
PBIS.S.2016b	84	87	100	83	88
S.2015	46	90	75	94	88
S.2015	59	97	75	100	100
S.2015	61	93	100	89	100
S.2015	78	97	100	100	88
S.Detroit	46	70	100	72	50
S.2015	77	100	100	100	100
S.2015					
S.2015		80	75	78	88
S.2015					
SCTG.S.2016	19	57			100
SCTG.S.2016	28	63	50	61	75
SCTG.S.2016	32	47	25	44	62
SCTG.S.2016	39	73	75	72	75

SCTG.S.2016	40	67	75	72	50
SCTG.S.2016	49	70	50	78	62
SCTG.S.2016	58	57	100	67	12
SCTG.S.2016	60	100	100	100	100
SCTG.S.2016	60	100	100	100	100
SCTG.S.2016	63	83	100	83	75
SCTG.S.2016	83	90	100	94	75
S.2017, SCTG.S.2016	92	97	75	100	100
SCTG.S.2017	17	50	75	61	12
SCTG.S.2017	19	57	75	56	50
SCTG.S.2017	23	70	75	78	50
SCTG.S.2017	30	90	100	94	75
SCTG.S.2015	42	87	100	83	88
SCTG.S.2017	57	77	100	78	62
SCTG.S.2017	84	77	100	67	88
S.2015	22	67	100	50	88
PBIS.S.2017b	22	67	100	61	62
SCTG.S.2015	87	93	100	89	100
SCTG.S.2016	22	33	50	33	25
SCTG.S.2017	77	77	100	78	62
SCTG.S.2015	52	87	75	94	75
SCTG.S.2016	41	87	75	89	88
SCTG.S.2015	33	77	100	67	88
S.2016	21	63	75	56	75
S.2016	39	80	100	72	88
S.2016	41	80	75	83	75
S.2016	42	93	100	94	88
S.2016	76	87			
S.2016	32	77	100	72	75
S.2016	40	90	75	94	88
S.2016	41	83	75	89	75
S.2016	41	77	75	72	88
S.2015	38	77	75	72	88
S.2015	51	80	100	72	88
PARS, S.2015	61	93	100	89	100
S.2015	62	97	75	100	100
S.2015	70	93	100	89	100
S.2015	71	87	75	83	100
SCTG.S.2017	23	70	75	67	75
SCTG.S.2017	24	73	50	83	62
SCTG.S.2017	24	73	100	72	62
SCTG.S.2017	28	77	100	72	75
SCTG.S.2017	30	90	75	100	75
SCTG.S.2017	30	90	100	94	75
SCTG.S.2017	31	93	100	94	88
SCTG.S.2015	89	93	75	94	100
SCTG.S.2016	66	70	100	61	75
SCTG.S.2016	81	87	75	89	88
SCTG.S.2016	86	83	75	89	75
SCTG.S.2016	86	93	75	94	100

S.2015	50	73	50	72	88
S.2015	53	83	75	83	88
S.2013	39	63	75	56	75
S.2013	53	67	100	56	75
S.2013	76	90	100	89	75
S.2016	24	67	75	61	75
S.2016	39	73	75	72	75
S.2016	44	80	100	78	75
S.2017	74	70	75	72	62
S.2016	40	87	100	89	75
S.2015	74	83	100	83	75
SCTG.S.2015	42	87	100	94	62
SCTG.S.2015	60	90	75	94	88
SCTG.S.2015	66	87	100	83	88
SCTG.S.2015	84	87	100	89	75
SCTG.S.2017	11	33	50	44	0
SCTG.S.2017	26	77	50	83	75
SCTG.S.2017	27	80	100	72	88
S.2017	14	43	100	39	25
PBIS.S.2016b	58	100	100	100	100
SCTG.S.2016	71	83	50	94	75
SCTG.S.2015	51	70	100	61	75
SCTG.S.2015	54	63	75	61	62
SCTG.S.2015	61	83	75	78	100
SCTG.S.2015	78	90	100	89	88
SCTG.S.2015	88	83	75	89	75
S.2017	21	63	50	56	88
SCTG.S.2017	21	63	75	56	75
SCTG.S.2017	27	80	100	78	75
SCTG.S.2015	86	97	100	94	100
SCTG.S.2017	24	73	75	67	88
SCTG.S.2017	26	77	100	72	75
SCTG.S.2017	26	77	100	78	62
SCTG.S.2017	30	90	100	89	88
SCTG.S.2017	32	97	100	100	88
PBIS.S.2017a		83	100	100	50
SCTG.S.2017	18	53	50	50	62
SCTG.S.2017	20	60	100	56	50
SCTG.S.2017	26	77	100	78	62
SCTG.S.2017	27	80	100	72	88
SCTG.S.2016	43	83	75	89	75
SCTG.S.2016	44	87	100	89	75
SCTG.S.2016	52	77	75	78	75
Equity.2016, SCTG.S.2015	52	80	75	83	75
SCTG.S.2015	61	93	75	100	88
SCTG.S.2015	64	97	100	100	88
Equity.2016, SCTG.S.2015	69	83	100	83	75
SCTG.S.2015	70	80	100	83	62
SCTG.S.2015	74	93	100	89	100

SCTG.S.2015	74	93	100	94	87
SCTG.S.2016	74	87	100	83	88
SCTG.S.2015	74	70	100	61	75
S.2016	21	60	75	50	75
S.2016	32	73	75	78	62
S.2016	36	67	75	67	62
S.2016	40	77	75	78	75
SCTG.S.2017	23	77	75	78	75
SCTG.S.2016	79	93	100	94	88
S.2016	26	70	75	61	88
S.2016	31	87	75	89	88
S.2015	28	83	100	78	88
S.2015	46	60	25	67	62
SCTG.S.2015	56	77	75	72	88
SCTG.S.2015	84	93	100	89	100
PBIS.S.2016b	48	87	100	89	75
PARS	14	43	50	39	50
S.2014	21	63	100	50	75
S.2014	56	67	75	56	88
PBIS.S.2017b	16	47	75	56	12
PBIS.S.2016b	34	63	75	61	62
PBIS.S.2016b	57	83	50	94	75
PBIS.S.2016b	58	67	75	61	75
PBIS.S.2016b	60	77	75	78	75
PBIS.S.2016b	62	90	100	83	100
PBIS.S.2016b	77	80	75	72	100
SCTG.S.2016	51	90	100	94	75
SCTG.S.2016	54	77	100	72	75
SCTG.S.2016	54	77	100	72	75
SCTG.S.2016	84	90	100	89	88
SCTG.S.2015	79	87	75	83	100
SCTG.S.2017	24	73	75	72	75
SCTG.S.2017	26	87	100	83	88
SCTG.S.2017	28	83	75	89	75
SCTG.S.2017		31	100	89	100
SCTG.S.2015	87	93	100	94	88
PBIS.S.2017b	24	73	50	83	62

T2 Total	**T2 Teams**	**T2 Intervention**	**T2 Evaluation**	**T3 Total**	**T3 Teams**
46	75	50	12	6	25
65	80	70	38	0	0
77	75	60	100	0	
62	88	60	38	0	0
92	100	90	88	56	75
12	12	20	0	3	0
8	25	0	0	12	0
62	75	50	62	85	88
81	88	80	75	74	88
96	100	100	88	91	88
100	100	100	100	88	100
77	88	90	50	82	88
73	88	80	50		
85	88	90	75	12	12
85	100	80	75	15	12
4	0	10	0	0	0
54	62	50	50	12	50
65	75	70	50	21	38
58	75	70	25	44	62
69	100	90	12	47	62
77	75	70	88	56	62
88	88	80	100	56	25
92	100	100	75	65	62
23	50	20	0	0	0
73	62	70	88	41	62
77	88	80	62	82	88
92	88	100	88	79	88
85	88	90	75	88	100
100	100	100	100	85	100
0	0	0	0	26	0
42	62	30	38	29	25
54	75	70	12	6	25
85	88	80	88	82	100
54	88	70	0		
65	100	80	12	21	0
77	88	90	50	21	62
77	75	100	50	62	50
77	100	80	50	0	0
69	88	100	12	62	88
69	88	100	12	68	88
81	88	100	50		
	39	75			
23	38	30	0		0
15	38	10	0	32	12
42	50	50	25	6	12

38	50	40	25	18	50
46	50	50	38	32	25
50	76	60	12	65	100
85	100	90	62	6	25
85	100	90	62	6	25
65	62	70	62	44	50
85	88	90	75	76	100
96	100	100	88	85	88

46	62	60	12	0	0
54	62	60	38	41	38
92	100	100	75	85	100

85	100	70	88	82	100
27	25	30	25	9	12

54	50	50	62	21	12
42	75	40	12	0	0
27	62	20	0	0	0

15	50	0	0	21	75
7	0	20	0	44	75
23	25	40	0	12	0
83				62	
23	62	10	0		
35	62	40	0		
46	75	60	0		
54	62	70	25		
42	50	60	12	0	0
62	75	80	25	21	62
85	100	90	62	15	62
92	100	90	88	9	12
92	100	90	88	32	75
81	100	80	62	50	62

0	0	0	0	0	0
92	88	100	88	82	100
62	62	60	62	65	62
65	62	80	50	88	100
88	88	90	75	85	75
85	100	90	62	79	100

88	100	90	75	0	0
88	88	100	75	0	0
46	62	40	38	12	25
46	50	60	25	47	62
73	75	80	62	65	88
8	85	0	0		
50	75	70	0		
62	75	80	25	0	
77	75	100	50	76	62
38	75	40			
69	88	70	50	71	88
35	50	30	25	9	38
46	62	50	25	44	62
65	88	50	62	47	62
100	100	100	100	71	100
0	0	0	0	0	0
58	75	60	38	21	62
58	50	70	50	71	75
31	50	20	25	50	50
54	62	50	50	47	50
58	75	60	38	44	50
88	88	90	88	59	62
88	88	80	100	91	100
85	88	90	75	76	88
0	0	0	0	0	0
54	62	60	38	0	0
42	50	70	0	9	12
77	75	100	50	12	25
65	75	70	50	18	12
81	88	80	75	18	50
77	75	80	75	26	50
81	75	80	88	47	75
88	100	100	62	47	62
88	100	90	75	47	75

96	100	100	88	41	25
77	100	60	75	62	75
81	88	80	75	74	75
4	12	0	0	0	0
27	38	40	0	0	0
46	88	50			
50	100	50	0	0	0
73	75	80	62	71	100
8	25			0	
8	25	0	0	0	0
31	12	60	12	43	50
50	75	60	12	41	38
85	100	90	62	76	100
65	100	70	25		
35	25	60	12	62	62
46	62	70	0	0	0
62	62	70	50	29	50
62	62	80	38	47	62
58	75	80	12	47	62
62	75	80	25	38	50
65	75	50	75	82	88
42	75	40	12	24	62
27	62	20	0	56	75
27	62	20	0	56	75
81	100	90	50	82	100
69	88	70	50	79	100
85	75	80	100	82	100
0				0	

T3 Resources	T3 Support Plan	T3 Evaluation	ODR 100 Day
0	0	0	0.239
0	0	0	0.563
			1.191
0	0	0	1.246
50	58	38	1.472
			0.381
0	8	0	0.784
0	33	0	0.39
			0.087
			0.708
83	100	62	0.253
67	75	62	0.567
83	100	88	0.592
83	100	62	0.043
100	83	62	0.742
			0.177
17	17	0	0.295
13	17	0	0.894
0	0	0	0.742
0	0	0	0.24
17	25	0	0.319
17	58	25	0.551
50	58	12	0.234
83	58	25	0.622
67	75	50	2.12
83	75	38	1.547
0	0	0	0.072
33	58	25	0.355
83	92	62	0.951
100	100	25	0.021
100	83	75	0.172
67	100	62	0.559
17	67	0	0.159
17	42	25	0.104
0	0	0	0.458
83	100	38	0.533
			0.43
0	50	12	3.774
0	17	0	1.543
67	67	62	2.111
0	0	0	0.221
83	67	12	0.128
83	67	38	0.066
			0.132
			0.404
			0.42
0	0	0	0.6
67	33	25	0.634
17	0	0	1.504

0	17	0	0.512
50	17	50	0.702
67	58	38	0.766
0	0	0	0.484
0	0	0	1.727
100	33	12	1.323
67	75	62	0.917
100	83	75	0.38
			0.119
			0.046
			0.197
			0.033
0	0	0	0.344
67	25	50	0.003
83	83	75	0.027
			0.029
			0.156
100	67	88	0.405
17	8	0	0.398
			0.055
50	17	12	0.953
0	0	0	0.797
0	0	0	0.752
			0.3
17	0	0	0.82
33	50	13	2.355
17	25	0	0.429
			0.608
			0.813
			0.872
			0.26
			0.595
0	0	0	0.445
0	17	0	0.92
0	0	0	0.87
0	0	12	0.441
33	25	0	0.544
17	58	50	0.996
			0.877
			0.456
			0.721
			0.703
			0.132
			0.835
0	0	0	11.233
83	75	75	0.673
83	83	25	0.28
83	100	62	0.609
67	100	88	0.322
100	75	60	1.375

0	0	0	2.177
0	0	0	2.005
33	0	0	0.047
67	50	12	0.245
83	67	25	0.086
			0.672
			0.889
			0.641
83	83	75	0.239
			1.33
50	83	50	0.55
0	0	0	0.193
0	83	0	0.059
67	42	25	0.164
67	58	62	0.066
0	0	0	0.173
			0.02
			0.36
			0.208
33	0	0	0.024
83	75	50	0.067
33	67	38	0.516
50	50	38	1.635
33	50	38	0.71
50	58	62	0.401
83	100	75	0.226
			0.636
			0.568
			0.827
83	67	75	4.071
			1.208
			0.599
			2.655
0	0	0	0.35
			0.57
			0.194
			0.218
			0.149
			0.477
			0.25
0	0	0	0.342
0	17	0	0.197
0	8	12	0.147
0	42	0	1.044
0	17	0	0.457
0	25	25	0.607
67	25	38	1.703
67	42	25	0.737
67	33	25	0.336

50	58	25	0.676
83	58	38	1.055
67	75	75	1.207
0	0	0	0.085
0	0	0	0.057
			0.707
0	0	0	0.608
			0.59
83	67	38	5.72
			0.575
0	0	0	0.388
			0.056
50	58	12	0.48
33	50	38	0.183
83	67	62	0.213
			0.64
			0.197
			0.088
50	83	38	0.895
			0.096
0	0	0	0.541
17	42	0	0.357
33	58	25	0.303
50	58	12	0.731
50	42	12	0.186
83	75	88	0.164
17	17	0	0.168
67	50	38	0.17
67	50	38	0.4
83	83	62	0.158
83	83	50	1.031
			1.552
			0.546
			0.053
			0.192
100	100	25	0.009
			9.186

Appendix E
MIBLSI's (n.d.) PPSC Stages of Implementation Indicators

Michigan's Promoting Positive School Climate (PPSC) Project
School Stages of Implementation Indicators

Matching supports to stage of implementation enhances the efficiency and effectiveness of School-wide Positive Behavioral Interventions and Supports (SWPBIS). While it is common to progress through stages across time, it is also expected that revisiting earlier stages of implementation may be necessary to achieve sustainable and durable implementation. Each school will progress through the stages at different rates.

The School Stages of Implementation Indicators reflect critical work happening within schools as they implement SWPBIS. These indicators are not designed to comprehensively address all stage-based work. Rather, the indicators are an attempt to assess efficiently by drawing from records and data sources that exist within the MiBLSi Database (MiData). For example, in Installation, schools work to set up SWIS and this type of activity is not captured in the indicators below. MiData looks for the presence of specific indicators to automatically assign a school's stage of implementation. In addition to enhancing efficiency, this automatic process is also designed to maximize consistency of reach data.

Stage	**Work Within the Stage**	**Indicators a School is in the Stage of Implementation** *All indicators must be met for a school to be considered in the stage unless otherwise indicated with an "-OR-".*
Pre-Exploration	Increase awareness and access to information at the leadership level and with all staff. Develop common definitions of key terms and better understand the "why" for implementation. This is the default stage assignment for schools that do not meet the criteria for other stages.	
Exploration / Adoption	Gathering information and communication regarding commitment to adopting the program/practices and supporting successful implementation through participation in Michigan's Promoting Positive School Climate Project.	• School has participated in MiBLSi Cohort 1-7. *School-level participation in Cohort 1-7 indicates that there are likely staff within the school who have participated in MiBLSi professional learning on MTSS, including PBIS, and have at least some level of implementation experience. This would mean that the school is likely better equipped to make decisions about the value implementation.*

Stage	Work Within the Stage	Indicators a School is in the Stage of Implementation *All indicators must be met for a school to be considered in the stage unless otherwise indicated with an "-OR-".*
Installation	Set up infrastructure so that successful implementation can take place and be supported. Establish team and data systems, collect data, develop plan.	• School cohort is assigned in MiData. *This marks an official partnership between the school and district/ISD.* • School roles are assigned in MiData: at least 3 people with the School Leadership Team Member role assigned, principal role assigned, at least one person connected to the school facility has the role of internal or external coach assigned. *Having school roles assigned means that a team has been formed, one of the critical infrastructures needing development in installation.* • Minimum of one team training session in MiData records (planned or already occurred) for the current school year (could be any of the following training titles: School-wide PBIS Day 1, School-wide PBIS Day 2, School-wide PBIS Day 3, Class-wide PBIS and Spring Data Review). *Training marks commitment to learning about at least some aspect of PBIS with the intent to implement.*
Initial Implementation	Try out the practices, work out details, learn and improve before expanding to other tiers.	• **Installation criteria are met and extended in the following ways:** • At least one SWPBIS TFI Tier 1 score in MiData for the current school year. *Schools complete this measure between SWPBIS Days 2 and 3. Having this data marks a difference between Installation and Initial Implementation.* • At least 1 time period (fall, winter, or spring) of discipline referral data in MiData for the current school year. *A school in initial implementation should have started collecting both fidelity and student outcome data.* • At least 1 set of school climate survey results in MiData for the current school year. *A school in initial implementation should have started collecting both fidelity and student outcome data.* • Minimum of 1 school-level data review coaching support session and 1 school-level data review training in MiData records (planned or already occurred) for the current school year. *Not only do schools need to collect data, but they must also engage in a process of using it for decision making.*

Stage	Work Within the Stage	**Indicators a School is in the Stage of Implementation** *All indicators must be met for a school to be considered in the stage unless otherwise indicated with an "-OR-".*
Elaboration	Expand the program/practices to other tiers in order to fully implement a <u>multi-tiered</u> behavioral framework, adjust from learning in initial implementation.	• **Initial Implementation criteria are met and extended in the following ways:** • At least 1 SWPBIS TFI (Tiers I, II, and III) implementation fidelity scores in MiData for during the past 2 years. And, the SWPBIS Tier I score must be at or above 70%. *Note that we have started "elaborating" here by gathering data at Tiers 1-3.* • At least 3 time periods of discipline referral data in MiData in the past 12 months. *This represents multiple cycles of problem-solving that should have cut across at least one fall, winter, and spring (but maybe not in that order).* • At least 2 sets of school climate survey results in MiData. *This represents multiple cycles of collecting school climate data.* • Minimum of three data review coaching support sessions and three school-level data review trainings in MiData records (planned or already occurred) for the current school year. *Both the coaching support session and team data review sessions are critical. Recall Kent McIntosh's research on sustainability-schools are more likely to sustain implementation when teams meet to look at data.*

Stage	Work Within the Stage	Indicators a School is in the Stage of Implementation *All indicators must be met for a school to be considered in the stage unless otherwise indicated with an "-OR-".*
Continuous Regeneration	Make it easier and more efficient while maintaining positive outcomes. Embed within current practices.	• **Elaboration criteria are met and extended in the following ways:** • At least 2 consecutive years of SWPBIS TFI (Tiers I, II, and III) implementation fidelity scores in MiData. And, the SWPBIS Tier I score must be at or above 70%. And, the second set of Tier II and III scores must be higher than the first set. *The difference here between elaboration and continuous regeneration is that a school now has 2 years of data, rather than potentially just one. Not only do they have the data, but it is showing improving or high levels of fidelity.* • At least 2 full years of discipline referral data in MiData showing decreasing rates. Or, a school could show at least 2 consecutive years of discipline referral rates below the national median. *This criterion is pretty rigorous. However, it represents our end goal-to positive impact student outcomes, making it one of the most critical indicators.* • At least 2 sets of school climate survey results in MiData showing improved school climate. *As does the indicator above, this represents our end goal-to positive impact student outcomes, making it one of the most critical indicators.* • Minimum of three data review coaching support session and three school-level data review trainings in MiData training records (planned or already occurred) for the current school year. *Both the coaching support session and team data review sessions are critical. Recall Kent McIntosh's research on sustainability-schools are more likely to sustain implementation when teams meet to look at data.*

Appendix F
Salkind's (2016, p. 189) Quick Approach to Determining Which Statistical Test to Use

Figure 9.1 A Quick (but Not Always Great) Approach to Determining Which Statistical Test to Use

Appendix G
PBISApps (2017, 2018) SWIS Summary Reports

PBISApps

SWIS Summary

2016–17 Academic Year
5716 Schools | 3,072,664 Students |
1,853,214 ODRs Data Reported August 2017

MAJORS ON LY

Grade Range	Number of Schools	Mean Enrollment per School	Mean ODRs/100 Students/ School Day	Median ODRs/100 Students/ School Day	25th Percentile ODRs/100 Students/ School Day	75th Percentile ODRs/100 Students/ School Day
K-6	3582	469	.34 (.60)	**.20**	.09	.39
6-9	1024	643	.48 (.67)	**.31**	.15	.57
9-12	526	931	.48 (.71)	**.28**	.16	.53
PreK-8	363	427	.55 (1.84)	**.27**	.12	.51
PreK-12	92	308	.90 (2.15)	**.26**	.15	.65

ODR=office discipline referral; (#)=standard deviation; Shaded column=most useful for decision making

PBISApps

SWIS Summary

2017–18 Academic Year
5553 Schools | 3,080,867 Students | 1,853,211
Major ODRs Data Reported August 2018

MAJORS ON LY

Grade Range	Number of Schools	Mean Enrollment per School	Mean ODRs/100 Students/ School Day	Median ODRs/100 Students/ School Day	25th Percentile ODRs/100 Students/ School Day	75th Percentile ODRs/100 Students/ School Day
K-6	3592	465	.34 (.47)	**.20**	.09	.42
6-9	1002	650	.46 (.57)	**.31**	.16	.58
9-12	517	970	.46 (.72)	**.29**	.15	.53
PreK-8	351	449	.45 (.79)	**.26**	.13	.56
PreK-12	91	332	.96 (1.82)	**.31**	.14	.85

ODR=office discipline referral; (#)=standard deviation; Shaded column=most useful for decision making

Appendix H
MIBLSI's (n.d.) Database Acceptable Use Agreement

MIBLSI

MIBLSI Database Acceptable Use Agreement

This document describes the intended purpose of the MIBLSI Database (MIDATA), user access and roles, and technology requirements. Districts and ISDs wanting to use MIDATA must read this agreement in its entirety and have an executive leader sign on the last page. This agreement must be signed by an individual who has the authority to release data on behalf of the district.

Author: Michigan's Integrated Behavior and Learning Support Initiative (MIBLSI)

Version: 1.1

Date: May, 2017

Purpose of MIDATA

The MIBLSI project uses the MIBLSI Database (MIDATA) as a primary system for collecting, storing, and generating reports/dashboards related to project goals and priorities. MIDATA is also designed for use by implementation teams and school leadership teams who are partnering with one or more of MIBLSI's programs as a tool to support data-based decision-making that will improve outcomes for students. This *MIBLSI Database Acceptable Use Agreement* provides information about who can access MIDATA, how access is managed, appropriate use guidelines, and how to obtain MIDATA computer/website support.

MIDATA Access

MIBLSI is based on layered supports across the educational cascade (school, district, ISD/RESA, state). MIDATA is therefore designed for use across the cascade. Upon signing this form below, any data entered into MIDATA will be accessible to anyone who has been granted the same level of user access or above. Even if data are entered into MIDATA per the Partnership Letter of Agreement, an ISD or district user will not be able to see data from that school or district until the district has signed this *MIBLSI Database Acceptable Use Agreement* form. Use of the MIBLSI Database is a privilege, not a right. Access is granted and managed/updated at multiple levels.

Michigan's Integrated Behavior and Learning Support Initiative (MIBLSI) is a Grant Funded Initiative (GFI), funded under the *Individuals with Disabilities Education Act* (IDEA) through the Michigan Department of Education.

MIBLSI

Table 1. MIDATA Access

MIDATA User Roles with data access	**Assigns/Manages MIDATA Roles** (providing others with data access)	**Data Access Level**	**Access Assigned By**
Statewide User (MIBLSI staff and select MDE staff)	Can assign ISD, District & School Level Roles Not responsible for maintaining roles and access	Statewide, ISD, District & School Level	MIDATA Domain Administrators
ISD Domain Administrator	Can assign ISD, District & School Level Roles Responsible for maintaining ISD Level roles	ISD, District & School Level	MIBLSI Staff
ISD User	Cannot assign or manage MIDATA Roles	ISD, District & School Level	ISD Domain Administrator
District Domain Administrator	Can assign District & School Level Roles Responsible for maintaining District Level roles	District & School Level	ISD Domain Administrator
District User	Cannot assign or manage MIDATA Roles	District & School Level	District or ISD Domain Administrator
School Domain Administrator (typically the Principal)	Can assign School Level Roles Responsible for maintaining School Level roles	School Level	District or ISD Domain Administrator
School User	Cannot assign or manage MIDATA Roles	School Level	School, District, or ISD Domain Administrator

Michigan's Integrated Behavior and Learning Support Initiative (MIBLSI) is a Grant Funded Initiative (GFI), funded under the *Individuals with Disabilities Education Act* (IDEA) through the Michigan Department of Education.

MIBLSI

Each user who is accessing the MIBLSI Database must adhere to the following guidelines:

1. User will act in a responsible, legal and ethical manner.
2. User will not attempt to harm or destroy data.
3. User will not attempt to access data or any other account owned by another user.
4. User will not use the information in MIDATA for any illegal activity, including violation of Federal and/or State Data Privacy laws. Anyone found to be in violation of these laws may be subject to Civil and/or Criminal prosecution.
5. Users who identify a security problem with MIDATA must notify the Ottawa Area ISD immediately.
6. Users will not share their login information with anyone.
7. Users will not set their own computer to automatically login to MIDATA to protect privacy.

Technical Requirements

MIDATA is accessible through any Internet connection with a modem connection of 56K or higher or any broadband (i.e. Cable, DSL, corporate) connection. MIDATA can be viewed using any internet browser on either a Windows-based or Macintosh-based machine. Computer/website assistance can be acquired by contacting the Ottawa Area ISD Help Desk at either help@oaisd.org or 1-877-702-8600 extension 3000.

MIBLSI

Acceptance

I have read and understand the information in this document and agree to allow MIBLSI to set up access to MIDATA for select individuals within my district/ISD/RESA.

____

District or ISD/RESA Name

____

Printed Name of District Executive Leader

____ __________________

Signature Date

District/ISD Domain Administrator

List contact information below for one individual within the district/ISD who should be set up as a Domain Administrator. Additional users can be added later.

____

Full Name

____

Email Address

____

District/ISD Role

Please email this signed form to Candi Drake at cdrake@miblsimtss.org

Contact Anna Harms, MIBLSI Evaluation & Research Coordinator, with any questions related to this *MIBLSI Database Acceptable Use Agreement* (aharms@miblsimtss.org).

Michigan's Integrated Behavior and Learning Support Initiative (MIBLSI) is a Grant Funded Initiative (GFI) funded under the *Individuals with Disabilities Education Act* (IDEA) through the Michigan Department of Education.