The Effect of Implementing a Trauma-Informed System on Student Academic Achievement, Student Attendance, and Student Behavior

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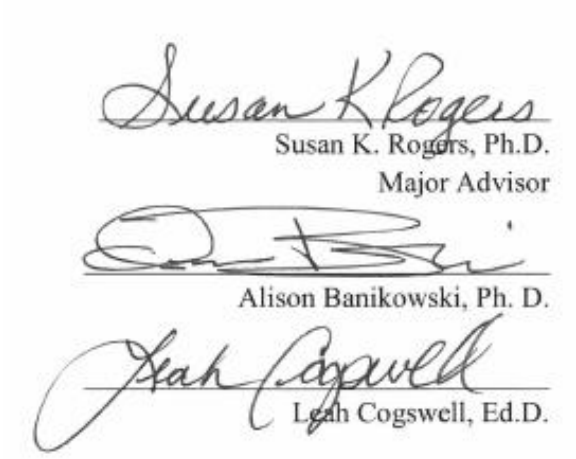

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Abstract

A growing number of students are attending schools having suffered adverse childhood experiences (ACEs) in their lives. These ACEs cause traumatic stress that can negatively affect student relationships (van der Kolk, 2014), behaviors (Gallagher, 2014), and academic achievement (Anda et al., 2006). The purpose of this study was to determine the effect of implementing a Trauma Sensitive Schools (TSS) model at a middle school on student academic achievement, behavioral referrals, attendance, and days missed due to out-of-school suspension. Data measuring these variables of students in one middle school in a suburban school district in Kansas City were collected for the year before implementation, the year of implementation, and the year after implementation. The results of the study showed that there are differences in student academic achievement after the implementation of a TSS model. Student achievement in mathematics and English language arts increased, while student scores in science remained the same. The effect on student behavioral referrals showed an increase in major and minor referrals throughout the study, as well as an increase in student days missed due to out-of-school suspension. The school and the district need to continue to provide professional development for the staff about the effects of trauma, how to deescalate student response to stimuli, and how to provide systems and structures to help make the school a safer place for students with a history of trauma. Additionally, school leaders should consider collecting and analyzing survey data from the teachers and students to adapt the model for their specific population. Finally, changing discipline strategies to match the new culture might further increase the positive effect of implementing a TSS model.

Dedication

This study is dedicated to my Lord Jesus Christ. Without His love, mercy, and grace I would not be able to break the chains. This study is also dedicated to my amazing wife, Tricia, for being my partner in this journey called life. Without your love, grace, determination, support, honesty, and accountability I would not have been able to fulfill this dream. Living life with you has forced me to grow in unexpectedly wonderful ways. The vows that we made to each other continue to ring true after these years of living life together.

Acknowledgements

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I would also like to acknowledge Dr. Alison Banikowski for her insights during the revision process which helped to make the information clearer and hopefully more impactful. Dr. Leah Cogswell, watching you finish your doctoral degree while you taught me what it meant to be an educational leader was impactful enough, only to have you then be on my committee. My deepest thanks go to you, Dr. Cogswell. To Dr. Michael Pragman and Dr. Chad Brinton for helping me obtain permission to conduct this research and for helping me obtain the data needed. Without the constant support, advice, and knowledge of Janelle Porter, I am not sure what would have been accomplished. She has been a true friend before and during this process.

Lastly to my Cohort 16, go my greatest appreciation and thanks. Your encouragement during the program, during the birth of my son, and after the classes ended will never be forgotten. We will have a great impact on the lives of students everywhere!

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Chapter 1

Introduction

The goal of education, according to the United States Department of Education (2011), "is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access" (Mission section, para. 1). Educators strive to assist students in learning how to become productive and valuable members of society. Students who have experienced trauma in their lives are more likely to lack self-regulation skills, which causes a problem when students enter the school system and are cognitively behind their peers, especially in problem-solving skills (Merritt & Klein, 2014).

A student's personal and family history affects his or her everyday attitude and work ethic, and often their family histories may involve experiences with traumatic events (Cole et al., 2005). Such trauma can include being the victim of physical abuse, being neglected, living with parents suffering from mental illness, witnessing community violence, witnessing instances of domestic abuse, and having a family member incarcerated (Felitti et al., 1998). Specifically, this type of event that occurs before a student has reached the age of 18 is considered an Adverse Childhood Experience (ACE), which is defined as the exposure of children to potentially traumatic events that may have lifelong consequences (Felitti et al., 1998). Honarpisheh (2012) stated, "Trauma refers to any event or accident and the collection of consequences that occur thereafter" (p. 1). Environments that consistently expose children to adversity, trauma, and chronic toxic stress can alter brain psychology and put them at risk for poor academic achievement,

mental health, and medical outcomes throughout their lives (Anda et al., 2006; Briggs-Gowan et al., 2010; Perry, 2004).

The lack of appropriate programs to limit the negative effects of trauma for students is one of the greatest problems that school leaders must face while attempting to run successful schools (Berg, 2017). According to a study conducted by the Data Resource Center for Child & Adolescent Health (2016), on average 46% of children under the age of 18 have experienced at least one ACE, with 21% of children experiencing two or more. Due to the negative effects of trauma on students in regard to academic and behavioral skills, accepted school practices are insufficient to meet the needs of students with this type of history (Copeland, Keeler, Angold, & Costello, 2007). Common policies do nothing to mitigate students with histories of traumatic experiences walking into schools, anticipating that the school environment is dangerous, and making it their mission to constantly evaluate their environment for risks and avoid them at all costs, causing them to miss the positive and loving messages from their teachers (Cole et al., 2005). Since many school staffs are underprepared and undertrained to deal with students who have experienced traumatic events, the effects can be seen in a growing number of students. Students who have experienced more traumatic events are associated with higher risks of repeating a grade, absenteeism, and lower school engagement (Bethell, Newacheck, Hawes, & Halfon, 2014).

Many district and school administrators have recently initiated changes in how they address the needs of students who have experienced trauma. These changes are impacting the students, as well as the culture of the school. These changes in systems and programs are quickly emerging, but due to its recency, they lack uniformity (Craig,

2016; Evans & Coccoma, 2014). One such change is the transformation from normal teacher behaviors, discipline procedures, and expectations to those specified in the Trauma-Sensitive-Schools (TSS) model (Cole et al., 2005). TSS leaders have decided current practices are not appropriate for their students, especially for those students who have dealt with traumatic situations in their personal lives, and the solution is to re-educate teachers and staff to care for all types of students by adopting the TSS framework and educating staff and students about the effects of trauma (Alvarez & Anderson-Ketchmark, 2009; Cole et al., 2005).

Background

This study took place in a Kansas City suburban school district, at Pineview Middle School, which served grades 6-8. This increasingly economically diverse district is one of the largest in the state. The community and business leaders in the district's attendance area support the schools with both time and finances, contributing to the successes the district has seen in its past.

According to the Missouri Department of Elementary and Secondary Education (DESE, 2018c), the district covered 87 square miles. As the county's largest school district both in terms of population and geographic size, it encompasses a population of approximately 140,682 people as of the latest census in 2010 (United States Census Bureau, 2018). Caucasians represent 84% of the population, followed by 7% African American, and 9% other ethnic backgrounds of American Indian, Asian, Hawaiian, and Hispanic populations. The female population is slightly higher than males at 51.4% compared to 48.6%. Approximately 91% of the community population has a General Education Development (GED) certificate or high school diploma while 10.6% are

considered living below the poverty line. Approximately 71% of the community population is employed; the average income for these individuals $76,342 while the median income was $63,676 (United States Census Bureau, 2018).

The total student population in 2018 for the district was 19,712 (DESE, 2018). Caucasian students represented 57.2% of the population, followed by 14.6% Hispanic students, 13.4% African American students, and 14.8% American Indian, Asian, Hawaiian, or multi-ethnic students. The percentage of students receiving free or reduced-price lunches was 47.7%, the percentage of students receiving English Language Learner (ELL) supports was 7%, and the percentage of students with Individual Education Plans (IEPs) was 10.6%.

In 2018, Pineview Middle School served a diverse population reflecting the population of the district community. The information in Table 1 includes the enrollment, free and reduced lunch numbers, students with IEPs, students receiving ELL supports, and race for 2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation. Race is disaggregated by Caucasian, African-American, Hispanic, and other which is made up of American Indians, Asians, Hawaiians, and Hispanic populations. The information in Table 1 also provides the number of students with Individual Education Plans (IEPs) and English Language Learners (ELL) represented at Pineview Middle School. This school is not the destination for students new to the country who need intensive language support, which limits the number of students receiving ELL services.

Table 1

Student Enrollment by School Year-Pineview Middle School

	2015-2016	2016-2017	2017-2018
Total Enrollment	821	812	811
Free/Reduced Lunch	469	493	504
Students with IEPs	91	92	95
ELL Students	40	39	39
Race			
Caucasian	462	450	411
African-American	141	135	138
Hispanic	117	122	140
Other	101	105	122

Note. Adapted from *Missouri Comprehensive Data System*, by Missouri Department of Elementary and Secondary Education, 2018c. Retrieved from http://mcds.dese.mo.gov/quickfacts/SitePages/DistrictInfo.aspx

DESE uses the Missouri School Improvement Program (MSIP5) to assess the district and to measure progress towards the goal "that all students will graduate high school, college, career, and life" (DESE, 2018b, p. 9). The MSIP5 gives each school an overall score for each of the five performance standards: academic achievement, subgroup performance, college and career readiness, attendance rate, and graduation rate (DESE, 2018b). According to DESE (2017), the attendance expectation is that in each school, at least 90% of students will attend 90% of the time. Table 2 provides the data representing the percentage of students that attended 90% of the time or more in this school from the 2015-2016 school year to the 2017-2018 school year.

Table 2

Percentage of Students Whose Attendance was 90% or Greater-Pineview Middle School

School Year	%
2015-2016	87.3
2016-2017	87.1
2017-2018	89.3

Note. Adapted from *Missouri Comprehensive Data System,* by Missouri Department of Elementary and Secondary Education, 2018c. Retrieved from http://mcds.dese.mo.gov/quickfacts/SitePages/DistrictInfo.aspx

The information in Table 3 shows the total number of students who scored advanced, proficient, basic, and below basic on the Missouri Assessment Program (MAP) assessment in English language arts, mathematics, and science. The State of Missouri uses these numbers as one measure of accreditation based on the MSIP5 program. The teachers and administrators are accountable for the overall results as well as the improvement of the scores from year to year.

Table 3

Total Number and Percentage of Students by Score on MAP Assessment-Pineview Middle School

	2015-2016		2016-2017		2017-2018	
	n	%	*n*	%	*n*	%
English Language Arts						
Advanced	130	16.4	123	15.5	183	22.9
Proficient	315	39.9	292	36.8	319	40.0
Basic	214	27.1	196	24.7	169	21.2
Below Basic	140	17.7	183	23.0	127	15.9
Mathematics						
Advanced	100	13.6	88	12.3	118	16.4
Proficient	115	15.7	140	19.5	183	25.4
Basic	230	31.3	190	26.5	274	38.0
Below Basic	289	39.2	206	28.7	145	20.1
Science						
Advanced	32	13.2	23	8.9	41	14.7
Proficient	97	40.1	97	37.3	111	39.8
Basic	80	33.1	101	38.9	90	32.3
Below Basic	33	13.6	39	15.0	37	13.3

Note. Adapted from *Missouri Comprehensive Data System*, by Missouri Department of Elementary and Secondary Education, 2018c. Retrieved from http://mcds.dese.mo.gov/quickfacts/SitePages/DistrictInfo.aspx

Pineview Middle School began the transition to a TSS model during conversations between teachers and leaders while constructing the schools' strategic mission in the spring of 2016. The choice to move to a TSS model began as a result of teacher input. Teachers were increasingly aware of the frequency and types of trauma their students were experiencing. At the same time, the teachers felt unequipped and unprepared to take care of the students' needs let alone address the academic content (building principal, personal communication, June 25, 2018). The committee of teachers and leaders chose the guiding statement of

> Trauma Sensitive Schools acknowledge and understand that students' prior experiences affect not only brain biology, but also beliefs systems. Trauma Sensitive Schools work to create an environment that is safe, while fostering relationships that create resilient humans. It's not just what we do, it's who we are. (building principal, personal communication, June 25, 2018)

To support the changes aligned to this guiding statement regarding developing a trauma-sensitive school, a robust plan for professional learning was developed and implemented. Principals and counselors attended training presented by Truman Behavioral Health during the summer of 2016 for five full days. TSS was introduced to staff by the principals and the counselors during professional development in August of 2016. School leadership attended team meetings for additional training with teams three times during the 2016-2017 school year. In January 2017, the building began a book study discussing *Fostering Resilient Learners: Strategies for Creating a Trauma-Sensitive Classroom* by Souers and Hall (2016). Additionally, the staff received a monthly newsletter that contained more information about trauma and resources to build

trauma-sensitive practices inside the classroom (building principal, personal communication, June 25, 2018).

During the 2017-2018 school year, a school leadership initiative called TSS 2.0 was introduced. Where during the first year of implementation the focus for staff was understanding the negative effects of trauma and general ideas for creating the culture in the classroom, the second year was more focused on specific strategies for working with students suffering from the negative effects of trauma. This program included professional development for the creation of behavior plans for students, doorway check-ins, brain basics, and de-escalation strategies. Also, lessons created by staff that focused on trauma and ways to become more resilient were presented to students during class time eight separate times throughout the school year (building principal, personal communication, June 25, 2018).

Statement of the Problem

> Traumatic experiences were defined by Rossen and Hull (2013) as:
>
> Those that are overwhelming; lead to strong negative emotions such as shame, helplessness, and fear; and involve some degree of experiences or witnessed threat to self, whether that threat is physical, mental, or emotional…it is subjective, developmentally bound, and individual. (p. 5)

According to the Data Resource Center for Child & Adolescent Health (2016), over 46% of children under the age of 18 have experienced at least one event that would be categorized as an ACE. Success in school for all students, including those who have experienced an ACE, determines student success later in life, so teachers try their best to teach academic, social, and behavioral skills throughout the school year (French, Home,

Popovici, & Robins, 2015). Students who have suffered prior traumatic experiences have an increased likelihood that they will struggle with self-regulation and social skills, qualify for special education services, drop out of high school, and not complete a 4-year college program (Dods, 2015).

In addition to the drastic impacts ACEs have on students, the staff working with students who have experienced trauma are impacted as well. Teachers become overwhelmed when dealing with student behaviors and needs (Alisic, Bus, Dulack, Pennings, & Splinter, 2012; Szente, Hoot, & Taylor, 2006). Handran (2013) stated that "When staff experience compassion fatigue from working with trauma survivors it can damage organizations in numerous ways and may lead to organizational issues such as low employee morale, high staff turnover, and, ultimately, delivery of inadequate services" (p. 13). Compassion fatigue can be summarized as the vicarious trauma that clinicians or teachers can experience when working with individuals suffering from the negative effects of trauma (Gallagher, 2013). School leaders must change the common practices and discover a successful way to balance helping students who have experienced trauma while supporting a change in climate that will also positively affect other students and staff. According to Bethell et al. (2014), the overwhelming evidence of the prevalence of trauma, the negative effects it has on children and adults, and the promising ways that have been developed to negate some of the negative effects of trauma should cause school leaders to translate the existing research into best practices. Continuing to not implement the research into practice allows students to leave the school system without the resources that they need to be successful.

Due to the amount of time that teachers spend with the students, teachers have the largest effect on student achievement (Hattie, 2012). Due to this impact, teachers should be the primary recipients of professional development. TSS shift the focus for teachers to create a safe and supportive environment that makes recognizing triggers that may initiate the fight or flight response for students a priority over academic work. Educational leaders in TSS understand that students need to feel safe, which encompasses academics, social, physical, and emotional safety (Bluestein, 2001). The problem that was addressed in this study was that most educational leaders and teachers do not have sufficient systems or practices that have been consistently shown to address the issues presented by students with backgrounds of trauma.

Purpose of the Study

The focus of this study was to determine whether the implementation of TSS at Pineview Middle School had an impact on student academic achievement, attendance, and behavior that lead to minor referrals, major referrals, and out-of-school suspensions. The first purpose of this study was to determine the extent there was a difference in students' English language arts, mathematics, and science subtest scores on the MAP during the year before TSS implementation, during the year of TSS implementation, and one year after TSS implementation. The second purpose of this study was to determine the extent there was a difference in students' minor referrals, major referrals, attendance, and the number of days missed due to outside school suspensions during the year before the TSS implementation, during the year of TSS implementation, and one year after TSS implementation.

Significance of the Study

"A good school is, almost by definition, trauma sensitive" (Mireles, 2010, p. 128) due to the amount of emphasis placed on the individual needs of students. Hill (2016) stated that the development of treatment procedures and policies is greatly needed to care for students who have been traumatized. The results of this study could assist educators and administrators in determining whether they should undergo the cultural change that comes with a shift to TSS. The negative impact of trauma could be lessened with more directed interventions, which would decrease the academic, physical, and long-term health effects for students (Blaustein, 2013). Additionally, the results of the current study could help school and district leaders be more knowledgeable about the effects shifting to TSS might have on the quality of education based on academic achievement, student behavior, and attendance.

Current research on TSS implementation in the general school setting is limited (Chafouleas, Johnson, Overstreet, & Santos, 2016), most of the prior research regarding trauma-informed practice has been initiated by agencies that have focused on specialized settings such as homeless shelters, juvenile detention centers, and mental health facilities (Evans & Coccoma, 2014). The findings from this study could add to the body of evidence by examining whether TSS programs may or may not have an impact on student achievement, behavior, and attendance, in a school setting (Dorado, Martinez, McArthur, & Leibovitz, 2016). Wilson (2013) stated that more research needs to be done, specifically about the effects of a TSS system on student referrals, suspensions, and academics. The current study was conducted with the hopes to add to the growing body

of evidence supporting the positive benefits of implementing a TSS system, specifically regarding its effect on student academic achievement, behavior, and attendance.

Delimitations

Lunenburg and Irby (2008) stated that "Delimitations are self-imposed boundaries set by the researcher on the purpose and scope of the study" (p. 134). The following delimitations apply to this study:

- The participants in this study were from one middle school in a Midwestern school district.
- The study included data collected during the school years of 2015-2016 (the year before the implementation), 2016-2017 (implementation year), and 2017-2018 (one year after the implementation).
- The results of the study are only based on the Missouri Achievement Program (MAP) as the measurement of students' academic achievement.
- The results of the study are only based on the data recorded by teachers and stored in the program Educator's Handbook as the measurement for minor and major referrals.
- The results of the study are only based on the data recorded by office personnel and teachers and stored in PowerSchool as the measurement for student attendance and days missed due to out-of-school suspension.

Assumptions

Lunenburg and Irby (2008) defined assumptions as "…postulates, premises, and propositions that are accepted as operational for purposes of the research" (p. 135). The following assumptions apply to this study:

- The attendance, discipline, and academic data were accurate.
- Teachers categorize student behaviors as major or minor referrals similarly.
- Trained proctors administered the MAP assessment to students.
- Students performed their best on the MAP assessments.
- Teachers were fully trained in the TSS guidelines.

Research Questions

According to Lunenburg and Irby (2008), research questions are critical parts of a dissertation that help to guide the direction of the study. The following is the list of research questions that are to be addressed during this study:

RQ1. To what extent is there a difference in students' MAP English Language Arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

RQ2. To what extent is there a difference in students' MAP Mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

RQ3. To what extent is there a difference in grade 8 students' MAP Science subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

RQ4. To what extent is there a difference in students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation?

RQ5. To what extent is there a difference in students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation?

RQ6. To what extent is there a difference in students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation?

RQ7. To what extent is there a difference in students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation?

Definition of Terms

Terms that are used throughout this study are defined here to give clarity so that the research may be interpreted accurately. The researcher used these definitions to focus on trauma and the dependent variables that were tested in this study.

Attendance. According to Balfanz and Byrnes (2012), the amount of time that a student is in class, with the assumption that they are only not in attendance due to an illness, family event, or some other crises is considered school attendance.

Major referrals. According to Todd et al. (2010), any behavior that a student exhibits that disrupts the learning or safety of a classroom or school to the extent that a school administrator must get involved is considered a major referral. These behaviors can include but are not limited to fighting, bullying, vandalism, and carrying a weapon. These behavior referrals may result in suspension (Todd et al., 2010).

Minor referrals. According to Todd et al. (2010), any behavior that a student exhibits that disrupts the learning or safety of a classroom or school but can and should

be handled by a teacher first is considered a minor referral. These behaviors may include but are not limited to inappropriate language, disruption, dress code violations, or being tardy to class (Todd et al., 2010).

Missouri Achievement Program (MAP). According to DESE (2018a), the MAP is a grade level assessment that is administered yearly to students enrolled in grades 3-8. The assessment is standards-based, given to all public and charter school students, and includes section testing English language arts, mathematics, and science.

Out of school suspension. Morrison and Skiba (2001) defined out-of-school suspension as a disciplinary action resulting in the student being forced not to attend school as a consequence of inappropriate actions.

Trauma. According to Honarpisheh (2012), trauma is "any event or accident and the collection of consequences that occur thereafter, which usually result in physical and mental emergency problems" (p. 3).

Organization of the Study

This study is presented in five chapters. Chapter 1 included an introduction, the background, the statement of the problem, the purpose of the study, the significance of the study, delimitations, assumptions, research questions, and the definition of terms. Chapter 2 is a review of the literature that includes trauma, the prevalence of trauma, effects of trauma, effects of trauma on teachers and students, common teacher and administrator responses, history of trauma-sensitive schools, trauma-sensitive schools, and the effects of implementing a trauma-sensitive schools program. In Chapter 3, the research design, selection of participants, measurement, data collection procedures, data analysis and hypothesis testing, and the limitations of the study are explained. Presented

in Chapter 4 are the descriptive statistics, results of the hypothesis testing, and the additional statistics. Chapter 5 includes the study summary, findings related to the literature, and the conclusions.

Chapter 2

Review of the Literature

Experiences in childhood, for better or worse, have a long-term impact on development, academic achievement, social-emotional and behavioral competencies, and overall health of students. This trauma can be caused by any individual person or event which can cause the brain of the child to develop differently than normally. ACE scores have been used to determine the amount of trauma an individual has encountered, as well as predict the possible impact. In response to the emerging research on impacts of trauma on students, schools have begun to implement TSS models with hopes that the structures will support students who have experienced trauma. The initial data regarding the implementation of the TSS model has been positive, but more is needed, especially as some states begin to mandate schools to pilot TSS programs. Chapter two includes a description of trauma, the prevalence of trauma, the effects of trauma, the effects of trauma on teachers and students, common teacher and administrator responses, the history of trauma-sensitive schools, trauma-sensitive schools, and the effects of implementing a TSS program.

Trauma

Trauma is an emotionally damaging experience that can cause long-term negative consequences on the health and well-being of an individual (United States Department of Health and Human Services & Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). These experiences cause damage to the socio-emotional and overall health of people due to the injuries suffered physically or emotionally (SAMHSA, 2014). In fact, children and young adults are particularly at risk

for long-term impacts as a result of trauma. In adolescence, the brain's structure is not fully formed, making youth more susceptible than adults to trauma and its long-lasting effects (Evans & Coccoma, 2014). When events such as abuse, domestic violence, terrorism, neglect, or natural disasters happen and are long-lasting, the effects can be compounded for an individual (Griffin, 2011; Wolpow, Johnson, Herterl, & Kincaid, 2009). Illegal activities happening inside the home as well as parents being deployed overseas for military duty can also cause trauma for youth (Sitler, 2009; Souers & Hall, 2016).

When youth experience multiple trauma events, the impacts are often intensified as well. The term complex trauma is used to describe "the experience of multiple, chronic, and prolonged, developmentally adverse traumatic events, most often of an interpersonal nature (e.g., sexual or physical abuse, war, community violence) and early life onset" (van der Kolk, 2005, p. 402). Blaustein (2013) contends that the effects of traumatic events become long-lasting due to the continued activation of the stress hormones and their impact on the brain and the body long after the event has ended. While there is a connection between traumatic event exposure and the creation of traumatic stress, not everyone who experiences trauma has the same reactions or impacts (Perfect, Turley, Carlson, Yohanna, Saint Gilles, 2016).

According to attachment theory, successful relationships are dependent on the bonds and exchanges we share with our caretakers (Ainsworth & Bell, 1970; Bowlby, 1969; Main & Solomon, 1990; Schore & Schore, 2008; van der Kolk, 2014; Verrinder, 2012). Disruptions in these bonds and exchanges with caretakers can cause lifelong issues with forming lasting and meaningful relationships (van der Kolk, 2014). "The vast

majority of people (80%) responsible for child maltreatment are the child's own parents" (van der Kolk, 2014). The U.S. Department of Health and Human Services (2013) reported that out of millions of reported child abuse cases, 40.7% were due to the mother, 20.3% due to the father, and 22.5% caused by both parents. Youth who have these disruptions and issues caused by trauma suffer from an inability to relate to peers and have deficiencies in cognitive, social, and emotional benchmarks. These traumatic events stemming from caregivers can happen even before memories are being formed, as the brain is taking in environmental information to form complex connections essential to survive (Siegel, 2001). As youth continue to experience traumatic events, the neurons in their mind continue to be changed in a different manner than normal, which then can lead to alterations in an individual's beliefs, perception of self, development of language, as well as negative consequences affecting the cognitive and emotional functions (Perry, 2001).

As the brain continues to develop, the effects of the trauma begin to affect different sections of the brain. Bloom and Farragher (2013) wrote that the negative effects of trauma are damaging to the brain and the body, which occurs with a greater degree over the life-span of the individual. Over time, the limbic system, which controls responses to social situations, danger, and fear, is altered due to these negative encounters with caregivers in childhood (Perry, Pollard, Blakley, Baker, & Vigilante, 1995). The overexposure to the stress response caused by the traumatic events alters the brain structures (Evans & Coccoma, 2014). According to van der Kolk (2014), when individuals encounter traumatic events, they often have issues with their response to stress. When stress does occur to traumatized individuals with issues in their limbic

system, they experience a heightened probability to be startled, freeze, or feel rage (van der Kolk, 2014).

Although trauma is consistently correlated to adverse development outcomes, the age at which the trauma occurs is a key factor as well. When the brain is overstimulated, it produces adrenaline and cortisol, which when this happens chronically, destroys brain cells (Hertel & Johnson, 2013). The part of the brain that is affected is generally determined by which part is developing the most when the traumatic event occurs (Perry, 2001). Infants who experience trauma are likely to have developmental issues with cognitive delays and a decrease in communication skills compared to early adolescents who are more likely to show a loss of concentration and memory (South Eastern Centre Against Sexual Assault & Family Violence, 2015). The structures affected could affect respiration, hyper-reactivity, self-soothing, motor control, memory, problem-solving, and impaired regulation of sleep (Perry, 2001). Since the brain builds upon itself in layers, disruptions earlier on in the developmental periods can have a disastrous effect on the subsequent layers; the earlier the trauma, the worse the effect is (van der Kolk, 2014).

Youth who have not experienced trauma but have witnessed traumatic events either in person or the media can have their brains changed by the event (Keysers, 2011). The brain does not distinguish between fiction or fact when a traumatic event is present, but it "assumes that a real danger exists in the world" (Newberg & Waldman, 2012, pp. 24-25). These events then become replayed in the mind and cause the fight-or-flight reaction to trigger for an event that may or may not have happened (Newberg & Waldman, 2012), which is one reason experiencing traumatic events as a child can lead to the development of post-traumatic stress disorder (Gabowitz, Zucker, & Cook, 2008).

Researchers and physicians have identified that the brains of individuals who have experienced trauma have at least two areas of their brains negatively affected, "the cerebellar vermis, which helps regulate cognitive functioning and the hippocampus, where short-term memory is converted into long-term memory" (Hertel & Johnson, 2013, p. 25). Newberg and Waldman (2012) reported that when individuals experience conflict and hostile language from caregivers in the home, the ability to create the neurochemical in the brain meant to protect the brain from stress was negatively affected. As infants, individuals learn to react to the stress that they perceive from the environment, but when they react, and their primary caregivers do not respond or are the source of the stress, then the result could be general dissociation or heightened fight or flight responses (Perry, 2001) However, the timing and size of the effects of trauma can vary depending on the trauma, the child, the environment, the level of support, and other factors (Bell, Limberg, & Robinson, 2013; Simonich et al., 2015; White-McMahon & Baker, 2016).

In an attempt to quantify trauma, a survey was created to determine how much trauma someone has experienced. An ACE score can be attributed to youth and adults based on the number of traumatic experiences that they have encountered throughout their lives. An individual can determine their ACE score by taking a ten-question survey, in which they are asked whether they have ever experienced the types of traumatic stress before the age of 18 (Stevens, 2012a); they are then given an ACE score ranging from one to ten. The original survey created in 1998 had seven categories of traumatic stress: psychological, physical, or sexual abuse; living with someone who either used street drugs or was an alcoholic, living with someone that had a mental illness, mother figure was treated violently, and criminal activity is occurring in the home (Felitti et al., 1998).

Based on additional research, three more categories were added to make 10 total: separation or divorce of parents, emotional neglect, and physical neglect (CDC, 2016).

The Prevalence of Trauma

The numbers of children and adolescents who have experienced a traumatic event are staggering, and the signs and symptoms of trauma are not always obvious (Dorado et al., 2016). In 2013, the U.S. Department of Health and Human Services indicated that more than three million referrals were made regarding the child abuse of 6.5 million children, with 47% of those victims being under the age of five. The prevalence of traumatic experiences is even higher for youth who live in poverty (La Greca et al., 2008), are placed in foster care (Salazar, Keller, Gowen, & Courtney, 2012), or have been in a correctional facility (Ryan, Bashant, & Brooks, 2006). More than two-thirds of students will experience at least one traumatic event in their lifetime (Perfect et al., 2016). Over 25% of children experience abuse or violence in the home (Duke, Pettingell, McMorris, & Borowsky, 2010).

In the benchmark study conducted by Felitti et al. (1998) using enrollees from the Kaiser Health Appraisal Clinic in San Diego, California as the sample population, 50.5% of the 8,056 participants reported having experienced one or more ACE, while over 25% reported experiencing two or more. With this original survey administered in 1998, there were only seven categories to choose from instead of the ten-category survey that is used currently (Stevens, 2012a), which might have increased the percentages. Bethell et al. (2014) conducted a study to determine the prevalence of ACEs in children to compare to the original study conducted by Felitti et al. in 1998. The researchers used data from the National Survey of Children's Health (NSCH) data, which surveyed 95,667 children

across the 50 states, averaging 1,800 children per state. Bethell et al. (2014) reported that 45% of the children surveyed in the United States had experienced at least one traumatic event in their life, with 30% of children between the ages of 12 to 17 experiencing two or more events in their lifetime. Studies conducted in both Ohio and Washington state showed that between 45% and 50% of children from various backgrounds had experienced at least one traumatic event in their lifetime (Blodgett et al., 2015; Sacks, Murphy, & Moore, 2014).

Additionally, Finkelhor, Ormrod, Turner, and Hamby (2005) conducted a study across the United States to determine the rates that children had experienced crime, violence, and experiences that made them a victim and found that youth who had experienced trauma had an ACE score of at least three. This study was based on a survey conducted using the Developmental Victimization Survey administered by the Bureau of Justice Statistics to 2,030 children between the ages of 2 and 17 years old from December 2002 to February 2003. The results showed that between 45% and 50% of individuals had experienced at least one traumatic event in their lifetime, with 25% to 30% of individuals experiencing two or more in their lifetime.

The number of youths who have been exposed to traumatic experiences is not likely to drop (Jaycox, Morse, Tanielian, & Stein, 2006). This idea is supported by the fact that the data collected from 1998 to 2016 regarding the prevalence of children experiencing one or more traumatic events has stayed consistent (Sacks and Murphey, 2018). The number of children experiencing trauma is staggering, but researchers argue that ineffective and insufficient assessment of trauma has resulted in a dramatic underestimation of the actual amount and impact of traumatic events (Finkelhor et al.,

2005; Sacks & Murphy, 2018). This underestimation is the likely result of a failure to include all of the possible types of traumatic experiences that individuals may face (Finkelhor et al., 2005; Sacks & Murphy, 2018).

Effects of Trauma

The negative effects of trauma can also be felt in society. In 2008, the cost of a single incidence of child abuse and neglect cost more than $1.3 million when the abuse and neglect led to the loss of life (Fang, Brown, Florence, & Mercy, 2012). The researchers (Fang et al., 2012) conducted a meta-analysis analyzing all negative effects of child maltreatment as well as data collected by the National Incidence Study and determined that additionally, the cost of nonlethal abuse and neglect was estimated to be $210,012 for a single incidence in 2000. The National Council for Behavioral Health (2018) reported that the total cost of untreated trauma and its negative effects was estimated at $161 billion in 2000 alone. Thielen et al. (2015) also determined the cost of child maltreatment in the Netherlands using data collected by the first Netherlands Mental Health Survey and Incidence Study. Data regarding risk factors of mistreatment, mental disorders, and the costs created by both were collected. The results of the data collected from 5,618 individuals found that the estimated cost on society ranged between 88 million euros ($102 million) and 395 million euros ($460 million) per one million individuals per year (Thielen et al., 2015). Other researchers state that the total costs cannot be calculated due to the immeasurable decrease in the physical and mental health of adults, the lost potential, and the cost of remedial interventions (Perry & Szalavitz, 2006; van der Kolk, 2006).

A reason for the high cost to society of trauma is that research has shown that high ACE scores negatively affect long-term health (Felitti et al., 1998). The study conducted by Felitti et al. (1998) included 8,056 individuals that had been to a clinic in the San Diego area and the researchers administered a survey focusing on their experiences with ACEs. The participants included

> Persons who had experienced four or more categories of childhood exposure, compared to those who had experienced none; had 4-to 12-fold increased health risks for alcoholism, drug abuse, depression, and suicide attempt; a 2- to 4-fold increase in smoking, poor health-related health, ≥50 sexual intercourse partners, and sexually transmitted disease; and a 1.4- to 1.6-fold increase in physical inactivity and severe obesity. (Felitti et al., 1998, p. 1)

Even without the presence of negative coping mechanisms, the presence of trauma in the early part of life is incredibly harmful to the human body. Additional research found that childhood trauma can cause

> Alcoholism and alcohol abuse, chronic obstructive pulmonary disease, depression, fetal death, health-related quality of life, illicit drug use, ischemic heart disease, liver disease, poor work performance, financial stress, risk for intimate partner violence, multiple sexual partners, sexually transmitted diseases, smoking, suicide attempts, unintended pregnancies, early initiation of smoking, early initiation of sexual activity, adolescent pregnancy, risk for sexual violence, and poor academic achievement. (Centers for Disease Control and Prevention, 2016, Major Findings, para. 3)

The presence of constant stress caused by trauma can lead to concerns "such as fibromyalgia, chronic fatigue, and immune system deficiencies" (Gabowitz et al., 2008, p. 164). This increase in concern is due to the "prolonged activation of the body's stress response system" which continues to alter the brain's structures and functions (Children's Defense Fund – Ohio, 2015, p. 2). These altered structures are likely to cause higher rates of "diabetes, heart disease, cancer, poor immune systems, depression, and obesity in individuals" with high ACE scores (Ohio Mental Health & Addiction Services, 2016a, para. 2).

The CDC (2016) reported that a dose-response relationship existed that showed the higher the ACE score, the more likely individuals are to abuse drugs and alcohol, participate in risky sexual behaviors, be the aggressor in cases of domestic abuse, and have unintended pregnancies. As an individual's ACE score increases, so do the rates of risky behavior. According to Éthier, Lemelin, and Lacharité (2014), youth who have experiences of trauma have a greater risk of developing harmful coping mechanisms to overcome the stress they constantly feel, which puts them in more danger of continued health and behavior issues in the present and future. The researchers studied 49 children for six years from areas around Quebec who had experienced childhood trauma and had been submitted to Child Protection Services (CPS) and found that the more intense the childhood trauma, the more likely that in a six-year period, children would have aggressive behavior and social withdrawal problems (Éthier et al., 2014). Individuals who have an ACE score of four or more were "twice as likely to smoke cigarettes, four and a half times more likely to use drugs, seven times more likely to suffer from chronic

alcoholism…nineteen more times likely to have attempted to commit suicide" (OhioMHAS, 2016a, p. 2).

Chronic stress caused by the psychological effects of traumatic events may also result in suicide attempts and obesity caused by negative coping mechanisms (OhioMHAS, 2016b). According to Osofsky (1997), traumatic events have a way of making a person feel vulnerable and powerless. According to Negele, Kaufhold, Kallenbach, and Leuzinger-Bohleber (2015), 75.6% of 359 surveyed chronically depressed patients reported histories of childhood trauma. Chapman et al. (2004) argued that adults with high ACE scores are more susceptible to depression than the population who did not suffer trauma as a child. They surveyed 9,460 adults from the San Diego area and found that women who experienced trauma had a 2.7 times greater chance of being depressed as an adult, and males who experienced trauma were 2.5 times more likely compared to those who did not. They also found a dose-response relationship between adult depression symptoms and ACEs (Chapman et al., 2004). Between 1999 and 2014, adolescent suicide attempts have been increasing and are one of the leading causes of death for teenagers (Curtin, Warner, & Hedegaard, 2016). "Suicide is the second leading cause of death in youth ages 10 to 34" (CDC, 2018, para. 5), and youth with an ACE score of six or higher have 5,000% higher probability of attempting suicide than those individuals that have not experienced a traumatic event in their lifetime (van der Kolk, 2014). Felitti et al. (1998) argued that if child abuse and other forms of childhood trauma were ended, the United States would see a drop in depression rates by more than 50% and suicide, drug use, and domestic violence by 75%. Bruce and Waelde (2008) found that when they surveyed 307 junior high and high school students in the

San Francisco Bay area that youth who experience abuse in their childhood are more likely to act aggressively, commit violent acts, and carry criminal behavior into their adulthood.

Effects of Trauma on Teachers and Students

Traumatic events can have effects on the students who experience them as well as the teachers who educate these students. The consistent amount of stress and the negative effects of traumatic events on students have a significant impact on all individuals within a school community (Blodgett et al., 2015). A survey conducted by the Washington State Family Council was administered to students in Washington, and Stevens (2012b) found that an average of 24 out of 30 students have one or more ACE, and 13 of those 24 students will suffer from an ACE score of three or more. This amount of trauma means that classroom teachers deal with students daily who are suffering from the negative effects of traumatic events (Jaycox et al., 2006), which then causes many teachers to feel overwhelmed by the additional needs these students may possess (Alisic et al., 2012; Szente et al., 2006). These additional needs are likely to cause higher rates of job-related stress, burnout, and leaving of the profession for teachers (Blodgett et al., 2015). Many teachers working with these students who experienced trauma misinterpret their students' behaviors and misdiagnose the root causes of those behaviors (Hattie, 2012). Often teachers who observe misbehavior from a student who experienced trauma inappropriately attribute those behaviors to attention-deficit hyperactivity disorder, autism, insubordinate, or a problem child (Mireles, 2010). Teachers and administrators may compound the issue by over-identifying these students for special education programs (van der Kolk, 2014). When teachers misread the needs of students with ACE

scores, students experience higher rates of failure in the classroom setting and lower achievement (Cole et al., 2005; Pecora et al., 2005).

Trauma affects each student differently, but two areas in schooling are most likely to be affected: academic performance and classroom behavior (Cole et al., 2005). Due to this difference, the way that the students need the adults in the room to interact with them can vary significantly. Sadly, the classroom environment and the people who inhabit the space may be cause for continued trauma for these students (Perry, 2006). These issues in the classroom have lasting effects as students with higher ACE scores also are more likely to have lower employability skills caused by a lack of interpersonal communication skills, relationship problems, emotional turmoil, and substance abuse (Anda et al., 2004). When analyzing data of over 9,600 employed adults in San Diego, Anda et al. (2004) found a significant difference in the means of workplace problems caused by health and well-being of the adult and the ACE scores caused by "interpersonal relationship problems, emotional distress, somatic symptoms, and substance abuse" (p. 30). Students often struggle in the school setting because their limbic system is activated and the ability for other parts of their brain to work correctly are impaired (Souers & Hall, 2016).

When studying 702 patients seen at the Bayview Childhood Medical Center from April 2007 to April 2009, researchers found that pediatric patients from an urban setting who had ACE scores of four or more are 32.6 times more likely to have learning problems when they are in school compared to students with an ACE score of zero (Burke, Hellman, Scott, Weems, & Carrion, 2011). The higher the ACE score, the more likely students would struggle to learn and suffer from additional academic concerns in their school career (Cole et al., 2005; Stevens, 2012a; West, Day, Somers, & Baroni,

2014; Wolpow et al., 2009). The effects of trauma also cause students to lack perseverance throughout their academic lives. Phasha (2008) chose 22 young adults between the ages of 15 and 23 in South Africa who had histories of traumatic events in their past. She then conducted a qualitative study including a questionnaire and interviews with both the students and the teachers. Students in this study shared that interest in school activities waned, absences from school increased, and it was common for work to be turned in incomplete or not at all (Phasha, 2008).

Crozier and Barth (2005) found that students from a nationally representative sample who had been victims of traumatic events scored much lower on standardized tests assessing cognitive function and academic achievement, with the effects being higher for African-American and Hispanic children. Out of a racially diverse sample of 2,498 children ages 6-15 who had been reported to child welfare agencies, "nearly 44 percent scored 85 or lower, 2.75 times higher than the expected average" (Crozier & Barth, 2005, p. 202). Youth who have histories of trauma may also have issues with organization, memorization, and attention due to the impact on the development of the brain (Cole et al., 2005).

After looking at self-reports of violence exposure and comparing them to the scores of 299 urban African-American first graders from Detroit on the Wechsler Preschool and Primary Scale of Intelligence-Revised, lower IQ scores were associated with the instance of violence (Delaney-Black et al., 2002). "A child experiencing both violence exposure and trauma-related distress at or above the percentile would be expected to have a 7.5-point decrement in IQ" (Delaney-Black et al., 2002, p. 280). These effects can be seen early in life according to Blodgett (2014) who found a

correlation between ACE scores of pre-school children to "teacher ratings of social-emotional, literacy, language, math, and cognitive abilities" (p. 3). Head Start staff were asked to report on 224 children in Spokane, Washington to identify social-emotional development, literacy development, language development, cognitive development, and math development. "In each instance, higher ACEs are associated with lower ratings of development mastery after controlling for demographic differences" (Blodgett, 2014, p. 3). When using the data available in the 2011-2012 Nation Survey of Children's Health, Bethell et al. (2014) found that students with ACE scores of two or more are 2.67 times more likely to repeat the same grade and 2.59 times more likely to be unengaged in the classroom compared to students with an ACE score of zero.

Students with high ACE scores tend to be more likely to have additional struggles with their behavior inside of the classroom and the school environment. Students who have experienced trauma in their childhood are likely to have disrupted attachments, which cause them to have issues making and keeping friends since they are more likely to react with hostility and become defensive due to expecting to be wronged (Leslie, 2010). Also, students who have experienced trauma are more likely to misinterpret a teacher's actions resulting in them not being receptive to the connections that teachers want to make with them (van der Kolk, 2010). Gallagher (2014) conducted a study in which she surveyed 42 teachers in a large urban school district in Massachusetts to determine their experience with student trauma in the classroom and what the symptoms of trauma looked like inside the school day. The most common behaviors that were reported to be exhibited by students were hyperactivity, impulsivity, disorganization, aggressiveness, withdrawal, and a low frustration threshold, which then causes frequent outbursts of

anger (Gallagher, 2014). These types of behaviors can sometimes cause teachers and other school employees to mislabel or come to incorrect assumptions about students, with staff using the term problem children frequently in qualitative research (Cook et al., 2005; Stevens, 2012a).

Terms such as 'problem children,' labeling the students as needing special education services and coupled with the diminished social skills that they possess, typically make students from trauma less engaged in school than their peers (Shonk & Cicchetti, 2001). When obtaining comprehensive teacher evaluations, camp counselor ratings, and school records, Shonk and Cicchetti (2001) were able to determine that trauma affected students' engagement in school, which then affected their social capacities and their ego development. Student self-esteem, self-regulation of behavior, ability to deal with environmental triggers, and internalizing and externalizing behaviors are negatively affected (Luke & Coyne, 2008; National Child Traumatic Stress Network, 2012; Shonk & Cicchetti, 2001). Additionally, because their perception of safety and self-regulation skills have been negatively affected (Tishelman, Haney, O'Brien, & Blaustein, 2010), they are at risk to experience additional traumas which could add to the impairments already happening (Cook et al., 2005). A student can misread a trigger in their environment, such as physical interactions with peers, and become violent, which can cause possible trauma for the student. Tishelman et al. (2010) reported that safety and the perception of being safe in the school environment were the biggest issues for students who come from a background of trauma.

Students who come from experiences of trauma are less able to concentrate on tasks and relax, which adds to detrimental academic outcomes and behaviors

(OhioMHAS, 2016b). Additionally, because students feel hurt, ashamed, or confused about their feelings related to the traumatic events, they are less likely to speak about them and receive support (OhioMHAS, 2016b). This isolation can then lead to increased feelings of revenge-seeking, anger, or contemplation of suicide (OhioMHAS, 2016b). These feelings also preoccupy students further, continually affecting their performance inside the classroom. The way that the students react to trauma when they behave inside the classroom depends on their current age, the age at which the trauma occurred, as well as the student themselves. These students may also have flashbacks or be preoccupied with the trauma, which continually keeps them behind with schoolwork (Jaycox et al., 2006). Students depend instead on negative coping mechanisms like apathetic behavior or aggressive behavior towards teachers to protect themselves. However, a student who is acting apathetic or aggressive toward peers or the instructor may not have any history of trauma (Sitler, 2009). If their needs are not being met at home, students may show other signs such as stealing food, overeating, or engaging in sexual promiscuity. This behavior by the students is partially due to the lack of safety, the lack of impulse control, and issues attempting to cope with the effects of the traumatic events. However, this could also be due to the creation of behaviors that these students have developed to fill the needs that are not being provided by their primary caregivers (Blaustein, 2013).

Common Teacher and Administrator Responses

Due to the abundance of issues that students with histories of trauma bring to the school system and teachers not being informed about best-practices to handle these students, teachers and school leaders have common practices to attempt to stop the negative behaviors from occurring. When teachers and leaders witness or are negatively

affected by student behavior and attempt to determine what is wrong with the student, the responses towards the student can lead to additional trauma for the student (Dorado et al., 2016; Overstreet & Chafouleas, 2016). Additionally, when students repeatedly act in negative ways in the classroom, they are referred to the principal's office, where there is an attempt to change the behavior of the student. Principals use their authority over the student and the teacher to request or demand a change in the behavior, which results in a power struggle or further negative actions (Souers & Hall, 2016). After reviewing over 800 studies, Hattie (2003) determined that these students, who already are struggling with their academics, miss more instruction time which lessens their achievement further. When presented with undesirable behaviors in students with histories of trauma, teachers can implement strategies that they believe might correct the issue but could actually make the student more likely to continue exhibiting the same behaviors.

Christle, Nelson, and Jolivette (2004) argued that "suspension is one of the most common disciplinary consequence used in schools for student problem behaviors" (p. 509). The National Center for Education Statistics (NCES) analyzed data collected by the NCES or the Census Bureau and reported that in 2006 about 7% of all students were suspended from school at least once per year (Snyder, Dillow, & Hoffman, 2007). Additionally, Fabelo et al. (2011) studied the school records of over 900,000 seventh-grade Texas students from 2001 to 2003 to review six years of data. When analyzing the data, he calculated that of the students who missed one period or more, 54% were suspended (Fabelo et al., 2011). Skiba and Rausch (2006) stated seven main reasons that suspension is being used in schools: keep the school safe, create a learning environment and culture, teach students how to act and behave so they can be successful, decrease

instances of misbehavior, keep students from making poor choices, remove problem students from the learning environment, and make sure all students know that there are consequences for misbehavior.

Students who have a background of trauma are not helped when the reaction to their behaviors is to punish them with suspension. Skinner (1953) purported that an unpleasant consequence that is effective would decrease the likelihood that certain behavior is repeated. However, Atkins et al. (2002) reported that students who are suspended due to misbehavior are more likely to be suspended again. Atkins et al. (2002) stated that when analyzing the discipline records of 314 inner-city youth who were suspended, the results suggested that being suspended served as a possible reward for these students. The researchers in this study compared students who had not been suspended, students who had only been suspended in the fall, and students who were suspended in the fall and the spring and found that more students were suspended in both terms than were suspended in just the fall term, showing that the punishment did not suppress the behaviors for more of the students (Atkins et al., 2002). Also, Fenning and Bohanon (2006) stated that even though suspensions are meant to decrease the likelihood of behaviors from students, the students were more likely to repeat the same behaviors. More recently, Losen and Skiba (2011), relying on data collected by the Civil Rights Data Collection Survey, added that being suspended does not seem to create remorse in students, but instead makes them angry and more likely to worsen their behavior when they are back in the school environment. Most suspensions assigned to students who have a history of trauma are not stemming from dangerous behavior; however, 95% of

the suspensions nationwide are a result of behaviors that disrupt the learning environment (Children's Defense Fund - Ohio, 2015).

Students who are not in the school building or the classroom suffer from academic regression. Hattie (2017) analyzed over 1,200 meta-analyses to determine what helped students progress academically the most and what held them back. According to his results, suspension has a -0.2 effect size on students, which means that receiving a suspension as a discipline consequence has a negative effect on academic achievement (Hattie, 2008). The academic issues being caused by suspension for students with a history of trauma likely stem from a loss of instructional time (Borman, Hewes, Overman, & Brown, 2002; Hattie, 2015). Skiba et al. (2003) reported that there was a negative relationship between suspension and the academic success of the student, making it hard to argue that suspending accomplishes the intended outcome of helping students and the school. The researchers focused on student data from 26 states using the U.S. Department of Education Office of Civil Rights and the National Assessment of Educational Progress (NAEP) reporting. Skiba et al. (2003) determined that there were significant negative rank-order relationships between suspensions of eighth graders in those 26 states and the achievement of students on the mathematics, reading, and writing scores on the NAEP.

Students who come from a history of trauma and have high ACE scores already struggle in the classroom because of the effect trauma has on their development. However, when they are not in class due to their behavior, the academic divide between them and their peers is widened (Heitzeg, 2014). The lowered academic success could also be a result of a feeling of helplessness developed by the student when they are

suspended from school due to falling behind their peers in their work and learning (Casella, 2003). Finally, due to the increased difficulty in their academic lives, suspended students are more likely to repeat a grade than non-suspended students. Fabelo et al. (2011) reported that in their study of over 900,000 students in Texas beginning in their sixth-grade year the likelihood of repeating a grade was doubled if a student was suspended, and 31% of the students who were suspended or expelled repeated their grade.

Students' relationships with peers and adults inside the school are being disrupted when they are suspended as well. When students are suspended due to their behaviors stemming from traumatic stress, they can feel isolated, rejected, or threatened (OhioMHAS, 2016a). Not being in the classroom and the stigma that surrounds being suspended limit the ability of students to develop positive social behaviors (Christle et al., 2004). At 161 Kentucky schools, Christle et al. (2004) found that in schools that were suspending the most, students were not as connected to the school, did not have a sense of belonging with their peer groups, and tended to not belong to socially appropriate peer groups. These social issues could be caused by an increased feeling of "student shame, alienation, rejection, and breaking of healthy adult bonds" (American Psychological Association Zero Tolerance Task Force, 2008, p. 11). When students are not in class due to being suspended, all positive relationships that the student may have or gain are at risk (American Psychological Association, 2008; Christle et al., 2004).

History of Trauma Sensitive Schools

Morrow (1987) was one of the first to begin the discussion about ways to help traumatized students learn in schools. She outlined three elements that schools needed to

consider when working with these students: building a community education culture where the school and community work together for the education of the students, focusing on social and emotional development as well as academics, and providing a collaborative culture among the students (Morrow, 1987). Efforts to assist students who come from backgrounds of trauma have relied on similar methods that are used for students receiving other special services. These practices include pulling students out of the class or providing group treatment (Jaycox et al., 2006). However, many school districts and states are beginning to pilot and implement strategies and systems to assist students with high ACE scores (Cole et al., 2005; Wolpow et al., 2009).

One of the states that pioneered the development and utilization of the TSS systems, Massachusetts, began its work in earnest in 2000. In that year, the state government approved legislation that created a grant allocating schools financial support to pilot trauma-sensitive programs (Cole et al., 2005). The schools were not mandated to follow the framework that was provided by the state, but two of the six pilot schools proceeded with the recommendations (Mireles, 2010). When the data was reported, Cole et al. (2005) used the information gathered to develop a guide to student trauma, the effects of the trauma, and a system for schools to use to help combat the issue. In 2004, Massachusetts passed additional legislation assisting all schools in the state to help kids who are victims of traumatic experiences (Cole et al., 2005). Since then, many other states have passed legislation that either adopts a definition of an ACE, puts plans into motion to pilot similar programs, or asks the governor to find ways to combat the issue (Prewitt, 2017). The states that have passed bills related to trauma include California, Utah, Wisconsin, Illinois, Massachusetts, Missouri, Oregon, Washington, Arizona,

Minnesota, Texas, Vermont, New Mexico, and Florida (Overstreet & Chafouleas, 2016; Prewitt, 2017).

In June of 2016, the governor of Missouri signed into law Senate Bill 638, which established the "Trauma-Informed Schools Initiative." This legislation established a requirement for Missouri to have the staff from five pilot schools trained in recognizing and responding to the needs of students who come from a background of traumatic events. The framework that the DESE suggested for those pilot schools was developed by 21 organizations or individuals and listed resources for schools and districts to use (MO State Trauma Roundtable, 2014). The final report is not due to the General Assembly until December 31, 2019.

Trauma Sensitive Schools

In reports, bills, and interviews, the terms trauma-informed and trauma-sensitive are often used to describe a change in teachers and school systems. The phrase trauma-informed or trauma-informed care refers to the delivery of health and mental care that includes an understanding of how trauma affects individuals (Flatow, Blake, & Huang, 2015). The Trauma and Learning Policy Initiative (TLPI, n.d.) stated the phrase 'trauma sensitive' means that schools are focused on addressing the negative consequences of trauma by providing a culture of inclusion and safety for all students. Where a trauma-informed school recognizes the effects and prevalence of trauma (Flatow et al., 2015), a trauma-sensitive system is a dramatic change in paradigm in the entire school, not allowing support for traumatized students to be intermittent or dependent on individual teachers (Mireles, 2010). Gallagher (2014) and Crosby (2016) wrote that one of the essential elements of a trauma-sensitive classroom and school is that the focus is on

providing safety for all students, as well as providing interventions to meet all academic, behavioral, and social-emotional needs as best as possible. One of the main goals of teachers in this type of system is to avoid at all costs the likelihood of retraumatizing students with procedures, expectations, reactions, or classroom interactions (Mireles, 2010). The type of culture school leaders are trying to achieve when becoming trauma-sensitive is the same type of school that Hattie (2012) wrote was an effective school model. The effective school model described by Hattie (2012) was a school that had a culture of trust, safety, empathy, and allows students and staff to take academic and behavior risks to learn from their mistakes, which is similar to the TSS model.

The realization and development of programs that help students with high ACE scores are relatively new concepts in most states (Craig, 2016). Schools are beginning to rely on research-based practices to implement trauma-sensitive systems for their students and staff (Cole et al., 2005; Wolpow et al., 2009). Knowing that the amygdala becomes overstimulated and negatively impacts the normal functioning of the brain (Newberg & Waldman, 2012), trauma-sensitive models rely on research that shows that students that come from histories of trauma can benefit from situations that create positive emotions as it de-stimulates the amygdala (Willis, 2006).

Teachers who work in trauma-sensitive schools shift their thinking to a more holistic and empathetic approach towards their students. These teachers begin to ask questions about where the behavior is originating from rather than asking what is wrong with the student (Bloom & Farragher, 2013). Rather than focusing on punishing students for acting in inappropriate ways and possibly retraumatizing students with the reactions, these teachers and leaders assist the students in lowering their stress levels, learning how

to get control over their bodies, and continuing to feel safe in their environment (Dorado et al., 2016; Mireles, 2010).

The first step in becoming a TSS is for all staff to receive professional development regarding what trauma is and how it affects the students (Cole et al., 2005; Ko et al., 2008). The training of staff must be continuous and focused on what the school is seeing inside its walls and the community. Additionally, there must be a strong connection between the school and community health organizations that can gather the support needed for students dealing with trauma at a high level (Ko et al., 2008). Cole et al. (2005) stated that when schools are making the transition to a TSS, the identified students who have experienced trauma receive additional services, but the program affects all students. Mireles (2010) summarized that for a school to become a TSS, they must create a school environment that supports healing and recovery instead of punitive actions. Creating a common language and a shared vision is important during the training of teachers (Chafouleas et al., 2016). Teachers must leave the training understanding the experience of being abused (Downey, 2007) and knowing how to have more positive verbal and non-verbal communications with all students (Newberg & Waldman, 2012), reduce their own stress and that of students, teach important social behaviors, and use positive behavioral reinforcement instead of negative consequences (Anderson, Blitz, & Saastamoinen, 2015).

Cole et al. (2005) stated six unique elements that are required for schools to become a TSS. The six requirements include: “schoolwide infrastructure and culture, staff training, linking with mental health professionals, academic instruction for traumatized children, nonacademic strategies, and school policies, procedures, and

protocols" (p. 47). Additionally, East and Kenny (2007) wrote that to accomplish those six elements, teachers and leaders must help students develop their strengths, help students empower themselves, and include the community, parents, and students when developing school policies.

Staff training is vital to the system so that teachers and leaders can feel confident in what they are doing for these students and collaboratively develop interventions for all students inside the classrooms (Mireles, 2010). During the training, along with learning about the effects of trauma, teachers are also introduced to the idea of giving students who are misbehaving an ability to make mistakes and partnering with the student to develop skills and behaviors that they may be lacking (Gallagher, 2014). As actions and mindsets change in teachers, the students begin to feel as though the classroom is a safe place, and can begin to heal, develop meaningful relationships, and learn how to regain control of their actions (Gallagher, 2014). As the teachers and students learn more about trauma, TSS schools allow teachers and students to develop a school culture collaboratively and equally that assists in making the positive change schoolwide as well as empowering students (Coyne, Carnine, & Kame'enui, 2010).

Also, schools implementing TSS make it a priority to have a clear, consistent, and well-communicated set of policies, procedures, and set of consequences that hold students accountable while also avoiding retraumatizing them (Cole et al., 2005). It is impossible to prevent retraumatizing all students due to the spectrum of triggers, but by implementing the structures of the TSS, they can mostly be circumvented. When students misbehave or make behavioral mistakes in a TSS, the goal should be to continue to grow the student-teacher relationship, hold kids accountable for their actions, begin to

teach missing behaviors, and to keep the students time in class at a maximum (Cole et al., 2005; Penner & Wallin, 2012; Wolpow et al., 2009). School leaders are of the utmost importance as schools shift to a TSS model, as communication between leaders and teachers create the initial feeling of safety for the adults in the building (Bloom & Farragher, 2013; Cole, Eisner, Gregory, & Ristuccia, 2013). The shift to a TSS model begins with the leaders in the building, so much so that they must focus on how to integrate the elements of the system into their practices so that they can sustain the shift (Blodgett & Dorado, 2016). Leaders must also recognize and be able to combat the initial resistance to change by staff and students as the change may likely be slow and unsteady (Craig, 2016). Black (2015), acknowledging the slow change that can be seen by staff and systems, wrote that school leaders must give this type of shift three to five years.

Other than the students themselves, teachers are the variable that affects a student's success the most (Hattie, 2003), therefore, is it critical to gather support from teachers regarding being trauma-sensitive in knowledge and practice (Baweja et al., 2016). These individuals spend the most time with students with high ACE scores and are best able to determine individual supports and interventions for specific students (Baweja et al., 2016). Inside the classroom, teachers can use their new knowledge to not only provide more focused behavioral and emotional supports and interventions for students but can also focus on providing challenging content rather than stress-inducing (Willis, 2006). Teachers need to understand what triggers to avoid inside the academic setting such as fearing a bully, waiting to be called on to give a speech, or being ignored will cause a student to be distracted inside the classroom (Bluestein, 2001). When

students spend time being curious and challenged, their neurons are activated and are then more likely to be activated in the future. This activation of neurons means that the more that teachers can provide learning opportunities inside the classroom, the more the student will be able to learn inside classrooms and in their environment (Willis, 2006). Additionally, when academic supports need to be given, trauma-sensitive teachers can provide accommodations such as additional time to finish assignments, a place to work or go to when over-stressed, and additional executive functioning education that keeps the expectations high for these students while giving them the support that they need (National Child Traumatic Stress Network, 2012).

Once teachers and leaders are educated on the effects of trauma and how to support students that come from a history of trauma, they need to begin educating students about the topic (Cole et al., 2005). When students learn about trauma, mindfulness strategies, and how to stay calm in stressful situations the negative impact of trauma can be lessened (Bethell et al., 2014). Additionally, teachers need to help students focus on the areas in which they are competent, identify and process their emotions, and become involved in extra-curricular activities (Cole et al., 2005).

Effects of Implementing a Trauma Sensitive School Program

The effects of a TSS model on the symptoms of trauma, academic achievement in students, or behavior in students has not been written about extensively (Maynard, Farina, & Dell, 2017). However, the results of some studies have indicated that TSS are showing some improvements related to student behaviors and achievement (Dorado et al., 2016; Longhi & Barila, 2015; Oehlberg, 2008). Oehlberg (2008) conjectured that implementing a TSS model that includes administrative commitment, trauma-sensitive

disciplinary policies, professional development, education of the students about trauma and the brain, and the inclusion of mental health professionals into the school could have an impact on academic achievement, school climate, reduction in student behavior concerns, reduction in student absences, and a reduction in student's suspensions.

Teaching social-emotional learning (SEL) strategies is key to ensuring that students are cared for using TSS principles (Gulbrandson, 2018). SEL teaches students to notice their feelings and their physical sensations in order to begin to name and describe their emotions, which is one of the foundations in the TSS model (Gulbrandson, 2018). In a meta-analysis of 213 SEL programs at schools, Durlak, Weissberg, Dymnicki, Taylor, and Schellinger (2011) found an 11-percentile point gain in achievement in math and reading on tests such as the Stanford Achievement Test or the Iowa Test of Basic Skills. Although the researchers did not specify the TSS model, SEL focuses on building five core competencies that are similar to the main tenets of TSS: "positive sense of self, self-control, decision-making skills, a moral system of belief, and prosocial connectedness" (Guerra & Bradshaw, 2008).

The Conduct Problems Prevention Research Group (2010) studied the effects of implementing SEL for 2,937 students from Nashville, Tennessee, Seattle Washington, and central Pennsylvania in grades 1, 2, and 3. After students had been in the intervention provided to the 12 schools for all three grades, there was a significant change in authority acceptance, cognitive concentration, and social competence as reported by teachers and aggressive and hyperactive-disruptive nominations of students by peers. However, test scores in both reading and math were not consistently higher than those of the control schools.

The TSS model has also been shown to increase resiliency in students, which was defined by Bartley, Schoon, and Blane (2010) as a strength, a desirable quality, or characteristic that is likely to positively impact aspects of the performance, accomplishment, health, and wellbeing of an individual. Longhi and Barila (2015) conducted a study at an alternative high school in Washington that had implemented initiatives such as improving student coping skills, improving adult skills and knowledge of ACEs, and beginning mindfulness programs for students to assist in building resiliency as a skill. In 2013, the student population that was surveyed were 78% free and reduced lunch and 25% Hispanic, but the data showed that 70% of the surveyed students with higher resilience scores no longer had their grades as greatly affected by their ACEs as students that scored lower rates of resilience. Students with a low ACE score, but had learned resilience due to the safety, values, conversations, and the learning that the teachers instructed them had a .18 increase in their overall grade point average. Students with a medium ACE score but a high rate of resilience averaged .25 points higher, and students with higher ACE scores but higher rates of resiliency averaged .69 points higher (Longhi & Barila, 2015).

Additionally, Longhi and Barila (2015) reviewed the data from an elementary school in Orlando, Florida with a population of 85% free and reduced and 20% homeless. They found that implementing a culture of safety, connection, problem-solving, and learning helped to increase the academic and behavioral outcomes for the school. From 2003 when Fern Creek Elementary School began the program and its transformation in 2011, the school went from a D school to an A school according to the state report card

with 77% of students scoring proficient in reading and 85% scoring proficient in mathematics (Longhi & Barila, 2015).

Dorado et al. (2016) developed a program called Healthy Environments and Response to Trauma in Schools (HEARTS) in 2008. When the program was initiated in the San Francisco School District, the focus was on two elementary schools and one kindergarten through grade 8 school. The program quickly was initiated in four additional schools that served a large proportion of low-income and minority students. Through the adoption of Blaustein and Kinniburgh's (2010) research, the HEARTS program centered on creating positive attachments at the school, building self-regulation skills in students, and building competency. The researchers analyzed the data of 1,243 students for the first year of implementation with 76% qualifying for free and reduced lunch, 38% being African American, and 34% being Hispanic. Blaustein and Kinniburgh (2010) found that in the analysis of staff survey data, there was an increase of 27% when asked if they were able to spend more time on task in the classroom, 36% if they had spent more time in the classroom, and a 34% increase when asked about their school attendance. Additionally, when looking at the school's disciplinary and suspension data from the year before implementation, the year of implementation and the fifth year of implementation they found that there was an 87% decrease in incidents, 86% decrease in physical aggression, and a 95% decrease in out of school's suspensions (Dorado et al., 2016).

When implemented with fidelity, prior research results have shown that positive outcomes can be found by using the TSS model. While most of the research has focused on the impact the TSS model has on behavior referrals and discipline, researchers have

found that focusing on SEL skills can lead to an increase in student achievement. These impacts on behavior and academic achievement have been seen when analyzing different grade levels and with diverse student populations.

Summary

ACEs have many negative consequences on the natural development of the brain. With as many as 50% of students having an ACE score of 1 or higher teachers and administrators have begun to search for responses inside the classroom and more generally to the effects of this trauma. One available option that many states and schools are exploring and implementing is the TSS model. However, there is little research investigating the effects of implementing a TSS model on student's academics, behavior, and attendance. The purpose of chapter two was to describe trauma, the prevalence of trauma, the effects of trauma, the effects of trauma on students and teachers, common teacher and administrator responses, the history of trauma-sensitive schools, trauma-sensitive schools, and the effects of implementing a trauma-sensitive schools program. Chapter 3 includes the research design, the selection of participants, measurement, the data collection procedures, data analysis and hypothesis testing, and the limitations of the study.

Chapter 3

Methods

The first purpose of this study was to determine the extent there was a difference in students' English language arts, mathematics, and science subtest scores on the MAP during the year before TSS implementation, during the year of TSS implementation, and one year after TSS implementation. The second purpose of this study was to determine the extent there was a difference in students' minor referrals, major referrals, attendance, and the number of days missed due to outside school suspensions during the year before the TSS implementation, and during the implementation year, and one year after implementation of TSS. Chapter 3 is divided into the following sections: research design, selection of participants, measurement, data collection procedures, data analysis and hypothesis testing, and the limitations of the study.

Research Design

A quantitative research design was utilized in this study. Specifically, causal-comparative methods were used because the data has already been collected and cannot be controlled. Lunenburg and Irby (2008) stated that the causal-comparative research method is used when the researcher is not manipulating the independent variable and can measure at least two comparison groups. The dependent variables examined were student subscores on the MAP English language arts assessment, student subscores on the MAP mathematics assessment, student subscores on the MAP science assessment, minor referrals, major referrals, student attendance, and student school days missed due to out-of-school suspensions. The independent variable was the year (2015-2016, the year

before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation).

Selection of Participants

The group that is of the interest to the researcher and to which the results of the study should be generalizable in the target population (Lunenburg & Irby, 2008). The target population for this study was students in grades 6 through 8 who attended Pineview Middle School. Lunenburg and Irby (2008) defined purposive sampling as "involving selecting a sample based on the researcher's experience or knowledge of the group to be sampled" (p. 175). Purposive sampling was used to allow the researcher to select all of the students who attended Pineview Middle School during the years of the study. The sample for this study were the students who attended Pineview Middle School during the 2015-2016, 2016-2017, and 2017-2018 school years. Each year, between 811 and 821 students attended the middle school.

Measurement

This section details the information about the instrumentation used in this study, including the measurement, reliability, and validity. The instrumentation included the MAP English language arts assessment, the MAP mathematics assessment, the MAP science assessment, the number of minor and major referrals tracked by Educator's Handbook, student attendance reported by PowerSchool, and the number of school days missed due to out-of-school suspension. This section includes information regarding MAP English language arts, mathematics, science, the student achievement measurement, and student behavior and attendance information.

MAP assessment. The MAP assessment was created and implemented originally in response to the Missouri Outstanding Schools Act of 1993. The Act was written such that DESE, school administrators, parents, and other statewide stakeholders would collaborate to create the Show-Me standards. The standards, sometimes referred to as the Missouri learning standards, are then assessed yearly using MAP grade-level assessments given to students grade 3-8 throughout the state (DESE, 2017).

According to DESE (2017), in 2001, due to the passing of the No Child Left Behind Act (NCLB), states were required to develop both reading and mathematics assessments to be administered annually to students between grades three through eight, and once between the grades of ten and twelve. Science is assessed once in grades three through five, once in grades six through nine, and once between the grades 10 through 12. DESE contracted CTB/McGraw-Hill (CTB) in 2003 to help expand the then current assessment program for both English and mathematics, and in 2005 contracted again with CTB for the development of the science assessment (DESE, 2017).

A new MAP assessment was created and used in 2014-2015 that was aligned with the newly adopted Common Core Standards. English and Mathematics portions of the test were created using the Smarter Balanced Assessment Consortium's (SBAC) computer-adaptive item bank. This same year, new scales and cut scores were developed and used based on the adaptive item bank that SBAC had developed (DESE, 2017).

In 2015-2016, a new version of the MAP assessment was created and administered using comparable content and constructs to the assessment in 2014-2015 but did not use any common items. Because of the new version of the MAP, the 2015-2016 assessment was not statistically linked to previous assessments, and the new

reporting scales for English and mathematics were created after the Spring 2016 assessment. Therefore, the student scores in English and mathematics in 2015-2016 were the baseline, and the data from 2015-2016, 2016-2017, and 2017-2018 are directly comparable (Data Recognition Corporation, 2017). The Science portion of the assessment was created by the Iowa Testing Program (ITP) beginning for the 2014-2015 administration of the MAP. All scores from 2014-2015 to 2016-2017 are comparable (Data Recognition Corporation, 2017). In 2017-2018 a new science test was created and used as a pilot, to then have data available in the 2018-2019 school year (DESE, 2018d).

MAP student achievement measurement. The MAP assessment measures school achievement in English language arts (grades 3-8), mathematics (grades 3-8), and science (grades 5 and 8). DESE then uses the results of the MAP assessment to monitor the progress of Missouri's students toward mastering the Show-Me standards. The data is then used to communicate to the state, cities, and local communities the level of performance of the schools, as well as determining the specific student services needed throughout the state (DESE, 2017).

The MAP assessment takes between five and ten hours to administer all portions to students, but the tests are not timed in their structure (DESE, 2017). These scores can be compared year to year because of the vertical nature of the standards, so a district should be comparing a student's scale score against the previous year's scale score (DESE, 2017). The results from these assessments are used to measure the variables specified in RQ1, RQ2, and RQ3.

MAP English language arts. The English portion of the MAP assesses the knowledge and proficiency students possess based upon the Show-Me standards in the

state of Missouri (DESE, 2017). English standards are separated into four separate categories: reading literary texts, reading informational texts, writing, and speaking and listening (DESE, 2016a). Among other tasks, students are expected to be able to make inferences, find the meaning of figurative language, determine themes, determine how text structure affects meaning, and understand the point of view and word choice in both literary and informational texts. Students are also expected to approach tasks as a researcher, approach tasks as a writer, and collaborate to show progress based on the Show-Me Standards (DESE, 2016a).

The English language arts assessment takes between one and a half to three hours to administer and includes multiple item types that include selected-response items graded by trained graders, short-text items, and technology-enhanced items that may require students to drag and drop information into a table, click on specific spots on a graphic, or respond within a graph. The assessment in each grade is different due to the difference in state standards. The grade 8 test includes a writing prompt that "is scored by a human reader using a 10-point rubric that evaluates purpose and organization, evidence and elaboration, and conventions" (DESE, 2017, p. 2). The scale score provided by the assessment in 2015-2016 and 2016-2017 ranges from 230-820. In order to score at the proficient level in English language arts, grade 6 students must score between 499 and 549, grade 7 students between 506 and 562, and grade 8 students between 518 and 569 (DESE, 2017). The scale score in 2017-2018 ranges from 230-650. For students to score in the proficiency level range, they grade 6 students must score between 413 and 437, grade 7 students between 435 and 455, and grade 8 students

between 443 and 475 (DESE, 2018). The MAP proficiency scales for the 2015-2017 test and the 2017-2018 test are located in Appendix A.

***MAP mathematics*.** The MAP mathematics portion assesses the knowledge and proficiency of students based on the Show-Me standards in the state of Missouri (DESE, 2017). Mathematics standards that are assessed by the MAP are placed into six categories for middle school students: ratios and proportional relationships; number sense and operations; expressions, equations, and inequalities; geometry and measurement; data analysis, statistics, and probability; and functions. Students are expected to be able to analyze proportional relationships, multiply and divide rational numbers, work with radicals and integer exponents, solve problems involving area, and define and compare functions along with many other tasks listed under the six categories (DESE, 2016b).

The mathematics assessment takes between one and a half to two hours to administer and includes multiple item types. The item types that are included are selected-response items, short-text items graded by trained graders, and technology-enhanced items that may require students to drag and drop information into a table, click on specific spots on a graphic, or respond within a graph. The scale score provided by the assessment ranges for 2015-2016 and 2016-2017 were from 290-770. In order to obtain a score at the proficient level in mathematics, grade 6 students must score between 518 and 554, grade 7 students between 528 and 563, and grade 8 students between 544 and 571 (DESE, 2017). The scale score in 2017-2018 ranges from 260-660. For students to score in the proficiency level range, they grade 6 students must score between 417 and 437, grade 7 students between 435 and 461, and grade 8 students between 468 and 505

(DESE, 2018). The MAP proficiency scales for the 2015-2017 tests and the 2017-2018 test are located in Appendix A.

MAP science. The MAP science assessment helps the state monitor the progress students have made toward mastery of the Show-Me standards (DESE, 2017). Science standards are separated into four categories: physical sciences; life sciences; Earth and space sciences; and engineering, technology, and application of sciences. Students are expected to know and apply matter and its interactions, understand ecosystems, know Earth's place in the universe, and be able to apply engineering design along with many other tasks (DESE, 2016c).

The science assessment for grade 8 students takes between two to two and a half hours to administer and includes multiple item types. The item types that are included are selected-response items, constructed-response items graded by trained graders, and technology-enhanced items that may require students to drag and drop information into a table, click on specific spots on a graphic, or respond within a graph. In the assessment, a performance event is graded by trained graders that students must answer providing extended responses and applying "their knowledge and understanding in real-life situations" (DESE, 2017, p. 2). The scale score provided by the assessment ranges from 230-820. In order to obtain a score at the proficient level in science, eighth-grade students must score between 703 and 734 (DESE, 2017). The MAP proficiency scales are listed in Appendix A.

The MAP assessment has been proven to be both a reliable and valid measure of student achievement. "Validity is the degree to which an instrument measures what it purports to measure" (Lunenburg & Irby, 2008, p. 181). Reliability refers to "the degree

to which an instrument consistently measures whatever it is measuring" (Lunenburg & Irby, 2008, p. 182). The MAP test created by the Data Recognition Corporation (DRC) has evidence of construct-related validity using studies of test reliability, evaluation of internal test structure, and evaluation of the relationship of test scores with external variables (DRC, 2017). The DRC evaluated the reliability of the MAP test using the reliability of raw scores, overall standard error of measurement, Item Response Theory-based conditional standard error of measurement, and decision consistency of achievement level classifications (DRC, 2017) in accordance to the American Educational Research Association (AERA), APA, and the National Council on Measurement in Education (NCME) (2014) standards.

Reliability of raw scores was evaluated using Cronbach's coefficient alpha. The coefficient is a ratio of the variance of true test scores to the variance of the total observed scores, with the values ranging from 0 to 1, the closer the reliability coefficient is to 1, the more consistent the scores (DRC, 2017). Coefficients that are equal to or higher than 0.80 are considered acceptable for moderate length tests (DRC, 2017). The reliability coefficients for the MAP test ranged from 0.90 to 0.92 for English language arts, 0.86 to 0.91 for mathematics, and 0.86 to 0.91 for science. Results such as these indicate the MAP assessments for all subjects are reliable tests (DRC, 2017).

> Evidence of validity based on test content was supported by the test specifications, including the test design and test blueprint. Missouri ELA and Mathematics assessments were developed in alignment with Missouri Learning Standards using ELA and Mathematics items from DRC's college- and career-ready item pool. Science assessments were built using the Missouri Science item

> pool and the Iowa Test of Basic Skills item pool developed by the University of Iowa. (DRC, 2017, p. 3)

Student behavior and attendance information. Student discipline referrals are logged by teachers, counselors, and administrators using the Educator's Handbook system. These referrals are then tracked by student, offense, location, time, and action taken. Teachers can indicate whether a referral is a minor or major offense when inputting the referral, and the offense is then marked as such. If the offense is marked as a minor referral, it is up to the teacher to handle any follow-up action. If the offense is marked as a major referral, then it would be sent automatically to the principal for possible student consequences. This information is stored in the Educator's Handbook system. Measurement for these variables was a total raw number of minor and major referrals for each student. The variables were specified in RQ4 and RQ5.

Student attendance is tracked using the PowerSchool program. Each hour, teachers record their classroom attendance online, and then the attendance officer in each building verifies the attendance of each missing student before officially marking them absent. This attendance data is then stored in the PowerSchool system where district and school administrators can access raw data sorted by the student, days absent or tardy, and percentage of days attended. The data available is a total attendance percentage out of 100% for each student, which provides measurement for the variable specified in RQ6. This total number of hours can vary depending on the students' enrollment date at the school for that particular year.

Student absences due to out-of-school suspension are tracked in the PowerSchool program. Each time that a student is suspended, administrators must track the reason, the

days suspended, and other pertinent information. This data is stored in the PowerSchool system, and the raw and sorted data can be retrieved by school and district administrators. The data available is a total number of days the student was assigned out-of-school suspension throughout the school year and was used to measure the variable specified in RQ7.

Data Collection Procedures

A request was submitted to Baker University's Institutional Review Board (IRB) on August 13, 2018 seeking approval to conduct the study and was approved on August 14, 2018 (see Appendix B). After approval by the IRB, a request was submitted to the district on August 21, 2018 to obtain permission to conduct the study, with approval from the district being given on September 6, 2018 (see Appendix C). Archived MAP data, minor and major referrals, student attendance totals, and days missed due to out-of-school suspension from the 2015-2016, 2016-2017, and 2017-2018 school years were retrieved from the district without personal identification information for the students. Archived student attendance percentages and student discipline referrals were gathered from these school years were obtained from PowerSchool and the Educator's Handbook systems. The data was compiled and organized into a Microsoft Excel worksheet and imported into IBM SPSS Statistics Faculty Pack 25 for PC for analysis.

Data Analysis and Hypothesis Testing

The researcher used archived quantitative data in this study. Each of the 19 hypotheses was tested using a one-factor analysis of variance (ANOVA). This section contains the research questions, the hypotheses, and the type of analyses used to test each hypothesis.

RQ1. To what extent is there a difference in students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

H1. There is a difference in grade 6 students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

H2. There is a difference in grade 7 students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation

H3. There is a difference in grade 8 students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation

Three one-factor ANOVAs were conducted to test H1-H3. For each of the ANOVAs, the categorical variable used to group the dependent variable, MAP English language arts subtest scores, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

RQ2. To what extent is there a difference in students' MAP mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

H4. There is a difference in the grade 6 students' MAP mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

***H5*.** There is a difference in the grade 7 students' MAP mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

***H6*.** There is a difference in the grade 8 students' MAP mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

Three one-factor ANOVAs were conducted to test H4-H6. For each of the ANOVAs, the categorical variable used to group the dependent variable, MAP mathematics subtest scores, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

RQ3. To what extent is there a difference in grade 8 students' MAP science subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

***H7*.** There is a difference in the grade 8 students' MAP science subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H7. The categorical variable used to group the dependent variable, MAP science subtest scores, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

RQ4. To what extent is there a difference in students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation?

***H8*.** There is a difference in the sixth-grade students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

***H9*.** There is a difference in the seventh-grade students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

***H10*.** There is a difference in the eighth-grade students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

Three one-factor ANOVAs were conducted to test H8-H10. The categorical variable used to group the dependent variable, student minor referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

RQ5. To what extent is there a difference in students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation?

***H11*.** There is a difference in sixth-grade students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation**.**

H12. There is a difference in seventh-grade students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

H13. There is a difference in eighth-grade students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

Three one-factor ANOVAs were conducted to test H11-H13. The categorical variable used to group the dependent variable, student major referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

RQ6. To what extent is there a difference in students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation?

H14. There is a difference in sixth-grade students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation.

H15. There is a difference in seventh-grade students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation.

H16. There is a difference in eighth-grade students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation.

Three one-factor ANOVAs were conducted to test H10. The categorical variable used to group the dependent variable, student attendance, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

RQ7. To what extent is there a difference in students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation?

***H17*.** There is a difference in the sixth-grade students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation

***H18*.** There is a difference in the seventh-grade students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation

***H19*.** There is a difference in the sixth-grade students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation

Three one-factor ANOVAs were conducted to test H17. The categorical variable used to group the dependent variable, Student days missed due to outside school suspensions, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

Limitations

According to Lunenburg and Irby (2008), limitations are "factors that may have an effect on the interpretation of the findings" (p. 133) that fall outside the control of the researcher. Limitations of this study included:

1. Teachers were fully trained in administering the MAP assessment; however, not all teachers may have followed the guidelines with fidelity.
2. Differences in the testing environments for students could have affected the results of the MAP assessment
3. Teachers were trained as to how to handle and document behaviors; however, not all teacher may have followed the guidelines with fidelity.
4. Teachers may have perceptions or bias towards some students that affected the documentation of behaviors.
5. Some teachers might not be implementing the TSS guidelines with fidelity.
6. Outside factors possibly impacted the results of the study

Summary

Included in chapter 3 was a description of casual comparative methods, as well as a listing of the dependent variables used in this quantitative study. The purposive sampling method was defined, as well as a description of the participants. The measurement of student achievement on the MAP, student attendance using reports from PowerSchool, and student discipline using the Educator's Handbook program were presented. The validity and reliability were explained for the MAP as well as a detailed explanation of the remaining dependent variables. The data analysis, hypothesis testing, and the limitations were presented for this study were listed. Chapter 4 contains the

descriptive statistics, the results of the hypothesis testing, and the additional analysis conducted.

Chapter 4

Results

The purpose of this study was to determine the extent there was a difference in students' English language Arts, mathematics, and science subtest scores on the MAP during the year before TSS implementation, during the year of TSS implementation, and one year after TSS implementation. An additional purpose of this study was to determine the extent there was a difference in students' minor referrals, major referrals, attendance, and the number of days missed due to outside school suspensions during the year before the TSS implementation, and during the implementation year, and one year after implementation of TSS. Chapter 4 is divided into the following sections: descriptive statistics, hypothesis testing, and additional analysis.

Descriptive Statistics

Due to the changing student enrollment numbers, student mobility, and other factors within the school, the numbers being reported change each year. Additionally, due to student count dates, special accommodations for students, and some students taking higher level math classes, not all students are required to be assessed in each subject during each school year. The number of students included in the sample by year and grade level is shown in Table 4.

Table 4

Total Pineview Middle School Students Assessed on MAP by Year

Year	Grade 6	Grade 7	Grade 8	Total
2015-2016	259	274	261	794
2016-2017	251	235	236	722
2017-2018	267	242	268	777

The number of students enrolled varied from year to year. The number of students was evenly distributed among three different grade levels throughout the three years. The number of students counted for behavior referrals and attendance is displayed in Table 5.

Table 5

Total Pineview Middle School Students Counted for Behavior and Attendance

Year	Grade 6	Grade 7	Grade 8	Total
2015-2016	259	274	261	794
2016-2017	251	235	236	722
2017-2018	295	279	297	871

Hypothesis Testing

The MAP assessment was used to determine student academic achievement the year before implementation of the TSS, the year of implementation, and the year after implementation. The same MAP English language arts, mathematics, and science assessments were used in 2015-2016 and 2016-2017. The MAP test and proficiency scales were altered prior to the delivery of the assessment during the 2017-2018 school

year (see Appendix A). Additionally, the science test administered to students in 2017-2018 was considered a field test, and scores were not reported. Because of these test revisions, the scores were not comparable across the three years. Two proficiency levels were coded from the MAP assessment subtest scores: below basic or basic and proficient or advanced. Due to these changes, the researcher altered the statistical test utilized for RQ1, RQ2, and RQ3 from an ANOVA to a chi square. The year after implementation results for science are not included due to a new pilot assessment being administered statewide during the 2017-2018 school year. This section contains the research questions and hypotheses, the analysis method used, the results of the testing, and tables presenting frequencies and other descriptive statistics.

RQ1. To what extent is there a difference in students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

***H1*.** There is a difference in grade 6 students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

A chi-square test of independence was conducted to address H1. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variable and proficiency level (below basic or basic, proficient or advanced) as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 7.874$, $df = 2$, $p = .020$. See Table 6 for the observed and expected frequencies. The observed frequency for below basic or basic in 2015-2016 ($n = 119$) was higher than the expected frequency ($n = 114.1$). The observed frequency for proficient or advanced in 2016-2017 ($n = 158$) was higher than the expected frequency ($n = 140.4$). The observed frequency for below basic or basic in 2017-2018 ($n = 130$) was higher than the expected frequency ($n = 117.2$). There is a difference in grade 6 students' MAP English language arts proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 6 students tended to score at the basic or below basic level the year before the implementation and the year after the implementation. Grade 6 students tended to score at the proficient or advanced level the year of implementation. H1 was supported. Cramer's V, the index of the effect size, indicated that 10.1% of the variability in the grade 6 students' MAP English language arts scores was explained by the school year.

Table 6

Observed and Expected Frequencies for H1

Year	Proficiency Level	Observed	Expected
2015-2016	Proficient or Advanced	140	144.9
	Basic or Below Basic	119	114.1
2016-2017	Proficient or Advanced	158	140.4
	Basic or Below Basic	93	110.6
2017-2018	Proficient or Advanced	136	148.8
	Basic or Below Basic	130	117.2

H2. There is a difference in grade 7 students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

A chi-square test of independence was conducted to address H2. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variable and proficiency level below basic or basic and proficient or advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 6.987$, $df = 2$, $p = .030$. See Table 7 for the observed and expected frequencies. The observed frequency for proficient or advanced in 2015-2016 ($n = 154$) was higher than the expected frequency ($n = 152.0$). The observed frequency for proficient or advanced in

2016-2017 (n = 144) was higher than the expected frequency (n = 130.8). The observed frequency for below basic or basic in 2017-2018 (n = 122) was higher than the expected frequency (n = 106.8). There is a difference in grade 7 students' MAP English language arts proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 7 students tended to score at the proficient or advanced level the year before the implementation and the year of implementation. Grade 7 students tended to score at the basic or below basic level the year after the implementation. H2 was supported. Cramer's V, the index of the effect size, indicated that 9.7% of the variability in the grade 7 students' MAP English language arts scores was explained by the school year.

Table 7

Observed and Expected Frequencies for H2

Year	Proficiency Level	Observed	Expected
2015-2016	Proficient or Advanced	154	152.0
	Basic or Below Basic	118	120.0
2016-2017	Proficient or Advanced	144	130.8
	Basic or Below Basic	90	103.2
2017-2018	Proficient or Advanced	120	135.2
	Basic or Below Basic	122	106.8

H3. There is a difference in grade 8 students' MAP English language arts subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

A chi-square test of independence was conducted to address H3. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variable and proficiency level below basic or basic and proficient or advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated there was not a statistically significant difference between the observed and expected values, $\chi^2 = 2.940$, $df = 2$, $p = .23$. See Table 8 for the observed and expected frequencies. There is not a difference in grade 8 students' MAP English language arts proficiency levels during the year before the TSS implementation, the implementation year, and one year after implementation. H3 was not supported.

Table 8

Observed and Expected Frequencies for H3

Year	Proficiency Level	Observed	Expected
2015-2016	Proficient or Advanced	120	129.2
	Basic or Below Basic	139	129.8
2016-2017	Proficient or Advanced	127	117.2
	Basic or Below Basic	108	117.8
2017-2018	Proficient or Advanced	133	133.6
	Basic or Below Basic	135	134.4

RQ2. To what extent is there a difference in students' MAP Mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

H4. There is a difference in the grade 6 students' MAP Mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

A chi-square test of independence was conducted to address H4. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variable and proficiency level below basic or basic and proficient or advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated there was a statistically significant difference between the observed and expected values, $\chi^2 = 14.371$, $df = 2$, $p = .001$. See Table 9 for the observed and expected frequencies. The observed frequency for below basic or basic in 2015-2016 ($n = 154$) was higher than the expected frequency ($n = 126.8$). The observed frequency for proficient or advanced in 2016-2017 ($n = 143$) was higher than the expected frequency ($n = 123.4$). The observed frequency for proficient or advanced in 2017-2018 ($n = 134$) was higher than the expected frequency ($n = 130.8$). There is a difference in grade 6 students' MAP mathematics proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 6 students tended to score at the below basic or basic level the year before the implementation. Grade 6 students tended to

score at the proficient or advanced level the year of implementation and the year after the implementation. H4 was supported. Cramer's V, the index of the effect size, indicated that 13.1% of the variability in the grade 6 students' MAP mathematics scores was explained by the school year.

Table 9

Observed and Expected Frequencies for H4

Year	Proficiency Level	Observed	Expected
2015-2016	Proficient or Advanced	104	126.8
	Basic or Below Basic	154	131.2
2016-2017	Proficient or Advanced	143	123.4
	Basic or Below Basic	108	127.6
2017-2018	Proficient or Advanced	134	130.8
	Basic or Below Basic	132	135.2

H5. There is a difference in the grade 7 students' MAP mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

A chi-square test of independence was conducted to address H5. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variable and proficiency level below basic or basic and proficient or advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated there was a statistically significant difference between the observed and expected values, $\chi^2 = 10.543$, $df = 2$, $p = .005$. See Table 10 for the observed and expected frequencies. The observed frequency for below basic or basic in 2015-2016 ($n = 157$) was higher than the expected frequency ($n = 141.9$). The observed frequency for below basic or basic in 2016-2017 ($n = 141$) was higher than the expected frequency ($n = 136.7$). The observed frequency for proficient and advanced in 2017-2018 ($n = 120$) was higher than the expected frequency ($n = 100.6$). There is a difference in grade 7 students' MAP mathematics proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 7 students tended to score at the below basic or basic level the year before the implementation and the year of implementation. Grade 7 students tended to score at the proficient or advanced level the year after the implementation. H5 was supported. Cramer's V, the index of the effect size, indicated that 12.1% of the variability in the grade 7 students' MAP mathematics scores was explained by the school year.

Table 10

Observed and Expected Frequencies for H5

Year	Proficiency Level	Observed	Expected
2015-2016	Proficient or Advanced	86	101.1
	Basic or Below Basic	157	141.9
2016-2017	Proficient or Advanced	93	97.3
	Basic or Below Basic	141	136.7
2017-2018	Proficient or Advanced	120	100.6
	Basic or Below Basic	122	141.4

H6. There is a difference in the grade 8 students' MAP Mathematics subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation.

A chi-square test of independence was conducted to address H6. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variable and proficiency level below basic or basic and proficient or advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated there was a statistically significant difference between the observed and expected values, $\chi^2 = 8.585$, $df = 2$, $p = .014$. See Table 11 for the observed and expected frequencies. The observed frequency for below basic or basic in 2015-2016 ($n = 175$) was higher than the expected frequency ($n = 160.0$). The observed frequency for proficient or advanced in 2016-2017

(n = 65) was higher than the expected frequency (n = 57.2). The observed frequency for proficient and advanced in 2017-2018 (n = 55) was higher than the expected frequency (n = 47.8). There is a difference in grade 8 students' MAP mathematics proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 8 students tended to score at the below basic or basic level the year before the implementation. Grade 8 students tended to score at the proficient or advanced level the year of implementation and the year after the implementation. H6 was supported. Cramer's V, the index of the effect size, indicated that 11.6% of the variability in the grade 8 students' MAP mathematics scores was explained by the school year.

Table 11

Observed and Expected Frequencies for H6

Year	Proficiency Level	Observed	Expected
2015-2016	Proficient or Advanced	37	52.0
	Basic or Below Basic	175	160.0
2016-2017	Proficient or Advanced	65	57.2
	Basic or Below Basic	168	175.8
2017-2018	Proficient or Advanced	55	47.8
	Basic or Below Basic	140	147.2

RQ3. To what extent is there a difference in grade 8 students' MAP science subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation?

H7. There is a difference in the grade 8 students' science subtest scores during the year before the TSS implementation, the implementation year, and one year after implementation

A chi-square test of independence was conducted to address H7. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variable and proficiency level below basic or basic and proficient or advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated there was not a statistically significant difference between the observed and expected values, $\chi^2 = 0.087$, $df = 1$, $p = .768$. See Table 12 for the observed and expected frequencies. There is not a difference in grade 8 students' MAP science proficiency levels during the year before the TSS implementation, the implementation year, and one year after implementation. H7 was not supported.

Table 12

Observed and Expected Frequencies for H7

Year	Proficiency Level	Observed	Expected
2015-2016	Proficient or Advanced	120	121.6
	Basic or Below Basic	139	137.4
2016-2017	Proficient or Advanced	112	110.4
	Basic or Below Basic	123	124.6

Note. 2017-2018 data unavailable due to pilot version of the MAP science assessment.

RQ4. To what extent is there a difference in students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation?

***H8*.** There is a difference in grade 6 students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

A one-factor ANOVA was conducted to test H8. The categorical variable used to group the dependent variable, student minor referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 10.198$, $df = 2, 782$, $p = .000$. See Table 13 for the means and standard deviations for this analysis. A follow-up post hoc was conducted to determine which pairs of means were different. The Tukey's Honestly Significant Difference (HSD) post hoc was conducted at $\alpha = .05$. Two of the differences were statistically significant. The 2017-2018 mean ($M = 3.212$) was higher than the 2015-2016 mean ($M = 1.546$). The 2017-2018 mean ($M = 3.212$) was higher than the 2016-2017 mean ($M = 1.734$). Grade 6 students' minor referrals were higher the year after the TSS implementation than one year before the implementation and the year of the implementation. H8 was supported. Partial eta-squared, the index of the effect size, indicated that 2.5% of the variability in the number of minor referrals was explained by the school year.

Table 13

Descriptive Statistics for the Results of the Test for H8

Year	*M*	*SD*	*N*
2015-2016	1.545	3.792	253
2016-2017	1.734	3.383	244
2017-2018	3.212	6.215	267

H9. There is a difference in grade 7 students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

A one-factor ANOVA was conducted to test H9. The categorical variable used to group the dependent variable, student minor referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F = .882$, $df = 2, 760$, $p = .414$. See Table 14 for the means and standard deviations for this analysis. A follow-up post hoc was not warranted. Grade 7 students' minor referrals were not different during the year before the TSS implementation, the implementation year, or one year after implementation. H9 was not supported.

Table 14

Descriptive Statistics for the Results of the Test for H9

Year	*M*	*SD*	*N*
2015-2016	2.328	4.937	268
2016-2017	2.571	5.338	231
2017-2018	1.985	4.601	242

***H10*.** There is a difference in grade 8 students' minor referrals during the year before the TSS implementation, the implementation year, and one year after implementation.

A one-factor ANOVA was conducted to test H10. The categorical variable used to group the dependent variable, student minor referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 3.959$, $df = 2, 756$, $p = .019$. See Table 15 for the means and standard deviations for this analysis. A follow-up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was conducted at $\alpha = .05$. One of the differences was statistically significant. The 2015-2016 mean ($M = 3.173$) was higher than the 2016-2017 mean ($M = 1.614$). Grade 8 students' minor referrals were higher the year before the TSS implementation than the implementation year. H10 was supported. Partial eta-squared, the index of the effect size, indicated that 1.0% of the variability in the number of minor referrals was explained by the school year.

Table 15

Descriptive Statistics for the Results of the Test for H10

Year	*M*	*SD*	*N*
2015-2016	3.173	7.660	254
2016-2017	1.614	3.877	228
2017-2018	2.841	6.701	268

RQ5. To what extent is there a difference in students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation?

***H11*.** There is a difference in grade 6 students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H11. The categorical variable used to group the dependent variable, student major referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F = 0.525$, $df = 2, 782$, $p = .592$. See Table 16 for the means and standard deviations for this analysis. A follow-up post hoc was not warranted. Grade 6 students' major referrals were not different during the year before the TSS implementation, the implementation year, or one year after implementation. H11 was not supported.

Table 16

Descriptive Statistics for the Results of the Test for H11

Year	*M*	*SD*	*N*
2015-2016	1.692	4.912	253
2016-2017	1.783	4.155	244
2017-2018	2.094	5.226	267

***H12*.** There is a difference in grade 7 students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H12. The categorical variable used to group the dependent variable, student major referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 8.302$, $df = 2, 760$, $p = .000$. See Table 17 for the means and standard deviations for this analysis. A follow-up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was conducted at $\alpha = .05$. One of the differences was statistically significant. The 2015-2016 mean ($M = 1.321$) was lower than the 2017-2018 mean ($M = 3.655$). Grade 7 students' major referrals were lower the year before the TSS implementation than one year after implementation. H12 was supported. Partial eta-squared, the index of the effect size, indicated that 2.1% of the variability in the number of major referrals was explained by the school year.

Table 17

Descriptive Statistics for the Results of the Test for H12

Year	*M*	*SD*	*N*
2015-2016	1.321	2.694	268
2016-2017	2.468	5.592	231
2017-2018	3.655	9.562	242

H13. There is a difference in grade 8 students' major referrals during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H13. The categorical variable used to group the dependent variable, student major referrals, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 4.379$, $df = 2, 756$, $p = .013$. See Table 18 for the means and standard deviations for this analysis. A follow-up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was conducted at $\alpha = .05$. One of the differences was statistically significant. The 2016-2017 mean ($M = 1.110$) was lower than the 2017-2018 mean ($M = 2.329$). Grade 8 students' major referrals were lower the implementation year than one year after implementation. H13 was supported. Partial eta-squared, the index of the effect size, indicated that 1.1% of the variability in the number of major referrals was explained by the school year.

Table 18

Descriptive Statistics for the Results of the Test for H13

Year	*M*	*SD*	*N*
2015-2016	1.772	4.242	254
2016-2017	1.110	2.713	228
2017-2018	2.329	5.964	268

RQ6. To what extent is there a difference in students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation?

***H14*.** There is a difference in grade 6 students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H14. The categorical variable used to group the dependent variable, students' attendance, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 10.732$, $df = 2, 782$, $p = .000$. See Table 19 for the means and standard deviations for this analysis. A follow-up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was conducted at $\alpha = .05$. Two of the differences were statistically significant. The 2015-2016 mean ($M = 95.6\%$) was higher than the 2017-2018 mean ($M = 94.1\%$). The 2016-2017 mean ($M = 95.9\%$) was higher than the 2017-2018 mean ($M = 94.1\%$). Grade 6 students' attendance percentage was higher the year before implementation than the

implementation year and one year after implementation. H14 was supported. Partial eta-squared, the index of the effect size, indicated that 2.7% of the variability in attendance percentage was explained by the school year.

Table 19

Descriptive Statistics for the Results of the Test for H14

Year	*M*	*SD*	*N*
2015-2016	95.6	4.2	253
2016-2017	95.9	3.5	244
2017-2018	94.1	6.4	267

H15. There is a difference in grade 7 students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H15. The categorical variable used to group the dependent variable, students' attendance, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 4.090$, $df = 2, 760$, $p = .017$. See Table 20 for the means and standard deviations for this analysis. A follow-up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was conducted at $\alpha = .05$. One of the differences was statistically significant. The 2015-2016 mean ($M = 95.6\%$) was higher than the 2017-2018 mean ($M = 94.2\%$). Grade 7 students' attendance percentage was higher the year before implementation than the year after implementation. H15 was supported. Partial eta-squared, the index of the effect size,

indicated that 1.1% of the variability in attendance percentage was explained by the school year.

Table 20

Descriptive Statistics for the Results of the Test for H15

Year	*M*	*SD*	*N*
2015-2016	95.6	3.9	268
2016-2017	94.5	5.8	231
2017-2018	94.2	6.8	242

H16. There is a difference in grade 8 students' attendance during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H16. The categorical variable used to group the dependent variable, students' attendance, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F = 1.341$, $df = 2, 756$, $p = .262$. See Table 21 for the means and standard deviations for this analysis. A follow-up post hoc was not warranted. Grade 8 students' attendance percentages were not different during the year before the TSS implementation, the implementation year, or one year after implementation. H16 was not supported.

Table 21

Descriptive Statistics for the Results of the Test for H16

Year	*M*	*SD*	*N*
2015-2016	93.9	5.6	254
2016-2017	94.7	4.9	228
2017-2018	94.1	6.6	268

RQ7. To what extent is there a difference in students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation?

***H17*.** There is a difference in grade 6 students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H17. The categorical variable used to group the dependent variable, students' number of days missed due to outside school suspensions, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F = 0.187$, $df = 2, 782$, $p = .829$. See Table 22 for the means and standard deviations for this analysis. A follow-up post hoc was not warranted. Grade 6 students' number of days missed due to outside school suspensions was not different during the year before the TSS implementation, the implementation year, or one year after implementation. H17 was not supported.

Table 22

Descriptive Statistics for the Results of the Test for H17

Year	*M*	*SD*	*N*
2015-2016	0.491	1.677	253
2016-2017	0.409	1.667	244
2017-2018	0.412	1.794	267

H18. There is a difference in grade 7 students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H18. The categorical variable used to group the dependent variable, students' number of days missed due to outside school suspensions, was year (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F = 0.575$, $df = 2, 760$, $p = .563$. See Table 23 for the means and standard deviations for this analysis. A follow-up post hoc was not warranted. Grade 7 students' number of days missed due to outside school suspensions was not different during the year before the TSS implementation, the implementation year, or one year after implementation. H18 was not supported.

Table 23

Descriptive Statistics for the Results of the Test for H18

Year	*M*	*SD*	*N*
2015-2016	0.423	1.786	268
2016-2017	0.417	1.542	231
2017-2018	0.573	2.189	242

H19. There is a difference in grade 8 students' number of days missed due to outside school suspensions during the year before the TSS implementation, the implementation year, and one year after implementation

A one-factor ANOVA was conducted to test H19. The categorical variable used to group the dependent variable, Student days missed due to outside school suspensions, was year (2015-2016, during the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation). The level of significance was set at .05.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F = 0.822$, $df = 2, 756$, $p = .440$. See Table 24 for the means and standard deviations for this analysis. A follow-up post hoc was not warranted. Grade 8 students' number of days missed due to outside school suspensions was not different during the year before the TSS implementation, the implementation year, or one year after implementation. H19 was not supported.

Table 24

Descriptive Statistics for the Results of the Test for H19

Year	*M*	*SD*	*N*
2015-2016	0.614	2.055	254
2016-2017	0.577	2.238	228
2017-2018	0.409	1.610	268

Additional Analyses

Upon completion of the hypothesis testing, a more detailed look at the individual proficiency levels across the three years was conducted. These additional analyses addressed the hypotheses about MAP proficiency but were coded following state reporting of the four proficiency levels (below basic, basic, proficiency, and advanced). The rationale for this addition was to determine if there were more specific changes among the four proficiency levels that could not be studied when the two proficiency levels were used for the hypothesis testing reported above. This additional testing was completed to address the possibility of a larger proportion of students scoring at a higher proficiency level but not moving from below basic or basic to proficient or advanced. In order to better communicate all of the potential of TSS implementation on academic achievement, it was helpful to determine the number of students who might have scored at higher proficiency among the four levels.

An additional chi-square test of independence was conducted to analyze changes in the proportion of grade 6 students who scored at each of the four proficiency levels when taking the MAP English language arts assessment across the three years. A two-way frequency table was constructed with year (2015-2016, the year before the TSS

implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variables and the proficiency level below basic, basic, proficient, and advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 32.086$, $df = 6$, $p = .000$. See Table 25 for the observed and expected frequencies. The observed frequency for below basic in 2015-2016 ($n = 50$) was higher than the expected frequency ($n = 39.7$), and the observed frequency for proficient in 2015-2016 ($n = 102$) was higher than the expected frequency ($n = 88.8$). The observed frequency for proficient in 2016-2017 ($n = 99$) was higher than the expected frequency ($n = 86$) and the observed frequency for advanced in 2016-2017 ($n = 59$) was higher than the expected frequency ($n = 54.3$). The observed frequency for basic in 2017-2018 ($n = 95$) was higher than the expected frequency ($n = 76.4$), and the observed frequency for advanced in 2017-2018 ($n = 71$) was higher than the expected frequency ($n = 57.6$). There is a difference in grade 6 students' MAP English language arts proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 6 students tended to score at the below basic or proficient level the year before the implementation. Grade 6 students tended to score at the proficient or advanced level the year of implementation. Finally, grade 6 students tended to score at the basic or advanced level the year after implementation. Cramer's V, the index of effect size, indicated that 14.4% of the variability in the grade 6 students' MAP English language arts scores was explained by the school year.

Table 25

Frequencies for Additional Analysis of Grade 6 ELA Proficiency Level

Year	Proficiency Level	Observed	Expected
2015-2016	Advanced	38	56.1
	Proficient	102	88.8
	Basic	69	74.4
	Below Basic	50	39.7
2016-2017	Advanced	59	54.3
	Proficient	99	86.0
	Basic	59	72.1
	Below Basic	34	38.5
2017-2018	Advanced	71	57.6
	Proficient	65	91.2
	Basic	95	76.4
	Below Basic	35	40.8

An additional chi-square test of independence was conducted to analyze changes in the proportion of grade 7 students who scored at each of the four proficiency levels when taking the MAP English language arts assessment across the year. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variables and the proficiency level below basic, basic, proficient, and advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 45.896$, $df = 6$, $p = .000$. See Table 26 for the observed and expected frequencies. The observed frequency for below basic in 2015-2016 ($n = 55$) was higher than the expected frequency ($n = 48.7$). The observed frequency for proficient in 2015-2016 ($n = 100$) was higher than the expected frequency ($n = 90.2$). The observed frequency for below basic in 2016-2017 ($n = 46$) was higher than the expected frequency ($n = 41.9$), and the observed frequency for proficient in 2016-2017 ($n = 99$) was higher than the expected frequency ($n = 77.6$). The observed frequency for basic in 2017-2018 ($n = 89$) was higher than the expected frequency ($n = 63.4$), and the observed frequency for advanced in 2017-2018 ($n = 71$) was higher than the expected frequency ($n = 55$). There is a difference in grade 7 students' MAP English language arts proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 7 students tended to score at the below basic or proficient level the year before the implementation. Grade 7 students tended to score at the below basic or proficient level the year of implementation. Finally, grade 7 students tended to score at the basic or advanced level the year after implementation. Cramer's V, the index of the effect size, indicated that 17.5% of the variability in the grade 7 students' MAP English language arts scores was explained by the school year.

Table 26

Frequencies for Additional Analysis of Grade 7 ELA Proficiency Level

Year	Proficiency Level	Observed	Expected
2015-2016	Advanced	54	61.8
	Proficient	100	90.2
	Basic	63	71.3
	Below Basic	55	48.7
2016-2017	Advanced	45	53.2
	Proficient	99	77.6
	Basic	44	61.3
	Below Basic	46	41.9
2017-2018	Advanced	71	55.0
	Proficient	49	80.2
	Basic	89	63.4
	Below Basic	33	43.4

An additional chi-square test of independence was conducted to analyze changes in the proportion of grade 8 students who scored at each of the four proficiency levels when taking the MAP English language arts assessment across the year. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variables and the proficiency level below basic, basic, proficient, and advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 28.596$, $df = 6$, $p = .000$. See Table 27 for the observed and expected frequencies. The observed frequency for below basic in 2015-2016 ($n = 76$) was higher than the expected frequency ($n = 55.1$). The observed frequency for proficient in 2016-2017 ($n = 95$) was higher than the expected frequency ($n = 81.1$). The observed frequency for basic in 2017-2018 ($n = 93$) was higher than the expected frequency ($n = 77.4$), and the observed frequency for advanced in 2017-2018 ($n = 54$) was higher than the expected frequency ($n = 41.1$). There is a difference in grade 8 students' MAP English language arts proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 8 students tended to score at the below basic level the year before the implementation. Grade 8 students tended to score at the proficient level the year of implementation. Finally, grade 8 students tended to score at the basic or advanced level the year after implementation. Cramer's V, the index of the effect size, indicated that 13.7% of the variability in the grade 8 students' MAP English language arts scores was explained by the school year.

Table 27

Frequencies for Additional Analysis of Grade 8 ELA Proficiency Level

Year	Proficiency Level	Observed	Expected
2015-2016	Advanced	31	39.8
	Proficient	89	89.4
	Basic	63	74.8
	Below Basic	76	55.1
2016-2017	Advanced	32	36.1
	Proficient	95	81.1
	Basic	64	67.8
	Below Basic	44	50.0
2017-2018	Advanced	54	41.1
	Proficient	79	92.5
	Basic	93	77.4
	Below Basic	42	57.0

An additional chi-square test of independence was conducted to analyze changes in the proportion of grade 6 students who scored at each of the four proficiency levels when taking the MAP mathematics assessment across the year. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variables and the proficiency level below basic, basic, proficient, and advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 20.750$, $df = 6$, $p = .002$. See Table 28 for the observed and expected frequencies. The observed frequency for below basic in 2015-2016 ($n = 58$) was higher than the expected frequency ($n = 49.9$). The observed frequency for basic in 2015-2016 ($n = 96$) was higher than the expected frequency ($n = 81.2$). The observed frequency for proficient in 2016-2017 ($n = 77$) was higher than the expected frequency ($n = 64.5$), and the observed frequency for advanced in 2016-2017 ($n = 66$) was higher than the expected frequency ($n = 58.9$). The observed frequency for below basic in 2017-2018 ($n = 55$) was higher than the expected frequency ($n = 51.5$), and the observed frequency for advanced in 2017-2018 ($n = 74$) was higher than the expected frequency ($n = 62.5$). There is a difference in grade 6 students' MAP mathematics proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 6 students tended to score at the below basic or basic level the year before the implementation. Grade 6 students tended to score at the proficient or advanced level the year of implementation. Finally, grade 6 students tended to score at the below basic or advanced level the year after implementation. Cramer's V, the index of the effect size, indicated that 11.6% of the variability in the grade 6 students' MAP mathematics scores was explained by the school year.

Table 28

Frequencies for Additional Analysis of Grade 6 Math Proficiency Level

Year	Proficiency Level	Observed	Expected
2015-2016	Advanced	42	60.6
	Proficient	62	66.2
	Basic	96	81.2
	Below Basic	58	49.9
2016-2017	Advanced	66	58.9
	Proficient	77	64.5
	Basic	71	79.0
	Below Basic	37	48.6
2017-2018	Advanced	74	62.5
	Proficient	60	68.3
	Basic	77	83.7
	Below Basic	55	51.5

An additional chi-square test of independence was conducted to analyze changes in the proportion of grade 7 students who scored at each of the four proficiency levels when taking the MAP mathematics assessment across the year. A two-way frequency table was constructed with years (2015-2016, during the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variables and the proficiency level below basic, basic, proficient, and advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 25.907$, $df = 6$, $p = .000$. See Table 29 for the observed and expected frequencies. The observed frequency for below basic in 2015-2016 ($n = 55$) was higher than the expected frequency ($n = 52.4$) and the observed frequency for basic in 2015-2016 ($n = 102$) was higher than the expected frequency ($n = 89.6$). The observed frequency for below basic in 2016-2017 ($n = 53$) was higher than the expected frequency ($n = 50.4$), the observed frequency for basic in 2016-2017 ($n = 88$) was higher than the expected frequency ($n = 86.2$) and the observed frequency for proficient in 2016-2017 ($n = 70$) was higher than the expected frequency ($n = 62.2$). The observed frequency for advanced in 2017-2018 ($n = 58$) was higher than the expected frequency ($n = 36.4$). There is a difference in grade 7 students' MAP mathematics proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 7 students tended to score at the below basic or basic level the year before the implementation. Grade 7 students tended to score at the below basic, basic, or proficient level the year of implementation. Finally, grade 7 students tended to score at the advanced level the year after implementation. Cramer's V, the index of the effect size, indicated that 13.4% of the variability in the grade 7 students' MAP mathematics scores was explained by the school year.

Table 29

Frequencies for Additional Analysis of Grade 7 Math Proficiency Level

Year	Proficiency Level	Observed	Expected
2015-2016	Advanced	27	36.5
	Proficient	59	64.6
	Basic	102	89.6
	Below Basic	55	52.4
2016-2017	Advanced	23	35.1
	Proficient	70	62.2
	Basic	88	86.2
	Below Basic	53	50.4
2017-2018	Advanced	58	36.4
	Proficient	62	64.3
	Basic	75	89.2
	Below Basic	47	52.2

An additional chi-square test of independence was conducted to analyze changes in the proportion of grade 8 students who scored at each of the four proficiency levels when taking the MAP mathematics assessment across the year. A two-way frequency table was constructed with years (2015-2016, during the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variables and the proficiency level below basic, basic, proficient, and advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 24.064$, $df = 6$, $p = .001$. See Table 30 for the observed and expected frequencies. The observed frequency for below basic in 2015-2016 ($n = 92$) was higher than the expected frequency ($n = 69.2$). The observed frequency for basic in 2016-2017 ($n = 114$) was higher than the expected frequency ($n = 99.8$), the observed frequency for proficient in 2016-2017 ($n = 36$) was higher than the expected frequency ($n = 29.9$), and the observed frequency for advanced in 2016-2017 ($n = 29$) was higher than the expected frequency ($n = 27.3$). The observed frequency for proficient in 2017-2018 ($n = 28$) was higher than the expected frequency ($n = 25$), and the observed frequency for advanced in 2017-2018 ($n = 27$) was higher than the expected frequency ($n = 22.9$). There is a difference in grade 8 students' MAP mathematics proficiency levels during the year before the TSS implementation, the implementation year, and one year after the implementation. Grade 8 students tended to score at the below basic level the year before the implementation. Grade 8 students tended to score at the proficient or advanced level the year of implementation. Finally, grade 8 students tended to score at the basic or advanced level the year after implementation. Cramer's V, the index of the effect size, indicated that 13.7% of the variability of the grade 8 students' MAP mathematics scores was explained by the school year.

Table 30

Frequencies for Additional Analysis of Grade 8 Math Proficiency Level

Year	Proficiency Level	Observed	Expected
2015-2016	Advanced	19	24.8
	Proficient	18	27.2
	Basic	83	90.8
	Below Basic	92	69.2
2016-2017	Advanced	29	27.3
	Proficient	36	29.9
	Basic	114	99.8
	Below Basic	54	76.1
2017-2018	Advanced	27	22.9
	Proficient	28	25.0
	Basic	77	83.5
	Below Basic	63	63.7

An additional chi-square test of independence was conducted to analyze H7. A two-way frequency table was constructed with years (2015-2016, the year before the TSS implementation; 2016-2017, the implementation year; and 2017-2018, one year after implementation) as the row variables and the proficiency level below basic, basic, proficient, and advanced as the column variables. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

The results of the chi-square test of independence indicated that there is not a statistically significant difference between the observed and expected values, $\chi^2 = .311$,

df = 3, *p* = .958. See Table 31for the observed and expected frequencies. The proportion of grade 8 students who scored at each of the four science proficiency levels did not change between the year before the TSS implementation and the implementation year.

Table 31

Frequencies for Additional Analysis of Grade 8 Science Proficiency Level

Year	Proficiency Level	Observed	Expected
2015-2016	Advanced	23	24.6
	Proficient	97	97.0
	Basic	101	91.1
	Below Basic	38	38.3
2016-2017	Advanced	24	22.4
	Proficient	88	88.0
	Basic	88	89.9
	Below Basic	35	34.7

Changes in student proficiency levels were observed more closely using the additional analyses. The proportion of grade 6, 7, and 8 students who scored at the below basic proficiency level for the MAP English language arts assessment remained the same or decreased across the years. This change was consistent for all three grade levels. Additionally, by the end of the study, more students were observed scoring basic or advanced than was expected. The additional analysis of the MAP mathematics assessment also uncovered a trend not uncovered with the original analysis. By the end of the study, student test score counts in advanced were higher than the expected for students at all three grade levels, while students' proficiency levels in the year after

implementation were higher than the expected outcome in all grade levels. Finally, after students in all three grades scored in the below basic proficiency band more than expected in the year before implementation, only grade 6 students scored above the expected a year after implementation. The additional analysis of the science data showed that with the examination of the four proficiency levels, there was still not a significant change in student academic progress. However, in 2015-2016 students' scores in the basic proficiency level band more than expected and that was not the case in 2016-2017. All other observed proficiency level scores remained at or close to the expected levels between the two years of the data.

Summary

Chapter 4 included the results of hypothesis testing for this study. Chi-square tests were conducted to determine the effect of the implementation of a TSS model on student academic achievement, while ANOVA tests were used to determine the effect of implementation on student attendance, minor and major referrals, and days missed due to out of school suspension. Additional analyses were conducted to determine if there were differences when coding four proficiency levels instead of two on student academic results on the MAP test. Chapter 5 includes the study summary, findings related to the literature, and conclusions.

Chapter 5

Interpretation and Recommendations

Trauma and the negative effects that come from experiencing traumatic events can have dramatic consequences for students. Students who have histories of trauma can display unsafe or undesired behaviors in a classroom setting that affect their academic performance and can make the setting unsafe for themselves and others (Blodgett et al., 2015). School leaders have typically used in-school and out-of-school suspensions to alter this behavior, which not only has been proven to be ineffective in changing behavior but also takes students out of the academic setting (Atkins et al., 2002; Christle et al., 2004). The purpose of this study was to determine the effects of implementing a TSS program on student academic performance, minor and major referrals, attendance, and days missed due to out-of-school suspensions. Chapter 5 includes a study summary, the findings related to the literature, and the conclusions.

Study Summary

Multiple studies have been conducted that have shown the negative effects of traumatic events on society (Fang et al., 2012), long-term health (Felitti et al., 1998), academics (Cole et al., 2005), and behavior (Leslie, 2010). Additionally, the number of students who are attending school with high ACE scores is consistent across schools and states (Bethell et al., 2014). School leaders have been handling this situation in a way that can cause additional trauma in students through suspensions and power struggles (Dorado et al., 2016). In this section are an overview of the problem, purpose statement and research questions, a review of the methodology, and a discussion of the major findings.

Overview of the problem. Almost half of the students under the age of 18 have experienced at least one ACE (Data Resource Center for Child & Adolescent Health, 2016). Some students who have experienced traumatic events as children will lack the basic academic and behavioral skills needed to complete high school or complete a 4-year college program (Dods, 2015). Knowing the negative effect of trauma on students, teachers must continue to try their best to teach academic, social, and behavioral skills throughout the school year (French et al., 2015). Teaching these skills will require teachers and school leaders to implement new systems and procedures.

Teachers can become overwhelmed when dealing with intense student behaviors and needs (Alisic et al., 2012; Szente et al., 2006), and as a result, school administrators must discover a successful way to help students who have experienced traumatic events while supporting a change in climate that will also positively affect staff. According to Bethell et al. (2014), the overwhelming evidence of the prevalence of trauma and the negative effects it has on children and adults should cause school leaders to translate the existing research into best practices. The TSS model requires schools to shift the focus for teachers and leaders to create a safe and supportive environment that makes recognizing impending trouble for students a priority over academic work.

Purpose statement and research questions. The focus of this study was to determine whether the implementation of TSS at Pineview Middle School had an impact on student academic achievement, attendance, and behaviors that lead to minor referrals, major referrals, and out-of-school suspensions. The first purpose of this study was to determine the extent there was a difference in students' English language arts, mathematics, and science subtest scores on the MAP during the year before TSS

implementation, during the year of TSS implementation, and one year after TSS implementation. The second purpose of this study was to determine the extent there was a difference in students' minor referrals, major referrals, attendance, and the number of days missed due to outside school suspensions during the year before the TSS implementation, and during the implementation year, and one year after implementation of TSS. Seven research questions were posed to determine the effect on academic achievement, minor referrals, major referrals, attendance, and days missed due to out-of-school suspension, and 19 hypotheses were tested.

Review of the methodology. A quantitative research design was utilized in this study. The dependent variables examined were student subscores on the MAP English language arts assessment, student subscores on the MAP mathematics assessment, student subscores on the MAP science assessment, minor referrals, major referrals, student attendance, and student school days missed due to out-of-school suspensions. The independent variable was the year (the year before the TSS implementation, the implementation year, and one year after the implementation). Purposive sampling was used to allow the researcher to select students who attended Pineview Middle School during the years of the study. Seven one-factor ANOVA tests were planned, but due to the change in the proficiency scales in 2017-2018, the scores were coded into categorical levels, and chi-square tests of independence were used to address RQ1, RQ2, and RQ3. Four one-factor ANOVA tests were used to address RQ4, RQ5, RQ6, and RQ7.

Major findings. A description of the results of the hypothesis testing that addressed the seven research questions and 19 hypotheses was provided in chapter 4. The two-category proficiency level analysis indicated that for MAP English language

arts, the proportion of grade 6 students scoring in the proficient or advanced level increased the year of implementation. Additionally, the four-proficiency level analysis revealed that for students in the below basic category decreased in all three grades while students in all grades scoring advanced increased from the year before implementation to the year after implementation.

Student proficiency levels in mathematics changed in a statistically significant way at all three grade levels when using the two proficiency levels and the four proficiency levels. The two-coded proficiency analysis indicated that the number of students in all grades scoring proficient or advanced the year after implementation increased. The additional analysis using the four proficiency levels revealed a decrease in students scoring below basic the year after implementation and students scoring basic decreased as well. Additionally, there was an increase in the number of students scoring advanced the year after implementation when compared to the year before implementation.

Science proficiency levels did not change in a statistically significant way. The original analysis showed a slight increase in students scoring proficient and advanced the second year. The additional analysis was conducted with the hope of seeing a more in-depth change in student scores, only to underscore that significant movement of student scores did not occur.

Student rates of minor referrals and major referrals were inconsistent throughout the study. Grade 6 minor and major referrals both increased significantly throughout the study without one year of a decrease. Grade 7 minor referrals decreased significantly throughout the three years, but the major referrals increased significantly. Grade 8 minor

and major referrals decreased significantly in 2016-2017 but then increased significantly in 2017-2018 with the major referrals ending higher than they started in 2015-2016.

Student attendance and days missed due to OSS were also inconsistent in their change. Both grades 6 and 7 attendance fell during the duration of the study, but grade 8 attendance improved. All students at all grade levels decreased their average days missed due to OSS, although grade 7 increased again in 2017-2018.

Findings Related to the Literature

The purpose of this study was to determine whether the implementation of the TSS program had an effect on student academic achievement, minor and major referrals, attendance, and days missed due to out-of-school suspension. Research related to this study was included in Chapter 2. This section will relate the findings of this study to previous research.

TSS programs and SEL models have been shown by many researchers to have a positive impact on the academic achievement of students. The results of this study are in agreement with Oehlberg (2008) who wrote that implementing a TSS model would increase student achievement. The results of the current study support Durlak et al. (2011) who wrote that academic achievement should increase with the implementation of an SEL focus.

There was a significant increase in minor referrals in grade 6, a decrease in grade 7, and a significant decrease in grade 8 during the time of this study. The results of the current study are mixed. The findings of the current study support Oehlberg (2008) who wrote that implementing a TSS model could have an impact on student behavior concerns. Similarly, Longhi and Barila (2015) found that implementing a TSS model

increased positive behavioral outcomes for students. The findings of the current study are inconsistent with the research conducted by Dorado et al. (2016), who found that the implementation of the TSS model had a significant decrease in incidents over five years. A possible reason for the inconsistency is that this study only lasted two years and was performed in a middle school instead of a kindergarten through grade eight building.

There was an increase in major referrals in all grades during the years in which data was collected. The results of the current study are inconsistent with the results of this study, Oehlberg (2008) who wrote that implementing a TSS model would decrease student behavioral concerns and suspensions. The findings of the current study are also inconsistent with the Conduct Problems Prevention Research Group (2010) who discovered that by implementing SEL strategies with students that there was a significant decrease in aggressive and hyperactive-disruptive behaviors in the classroom. The findings of the current study are in contrast to the results of Dorado et al. (2016) who wrote that there was a significant decrease in incidents, physical aggression, and suspensions after the implementation of TSS. One possible reason for the contrast between studies is that in this study, there was not a change in the building's discipline continuum alongside the TSS model implementation.

There was a significant decrease in attendance in sixth- and seventh-grade students and an increase in attendance for eighth-grade students. The results of the current study are mixed and are inconsistent with Blaustein and Kinniburgh (2010) who surveyed staff after the implementation of a TSS model. They found that when analyzing the staff survey data, there was a 34% increase in attendance ratings of specific students

in classrooms. One possible explanation for the inconsistency was that there was not a staff focus on student attendance unlike the study conducted by the researchers.

The results of the current study showed that there was not a significant difference in days missed due to out-of-school suspension in any of the grades. These findings are inconsistent with the findings of Dorado et al. (2010) who found that in the five years after the implementation of TSS there was a 95% decrease in suspensions. The results of the current study also contrast with Oehlberg (2010) who wrote that the implementation of TSS would decrease student suspensions. One possible explanation for this inconsistency was the lack of additional support for students when they were removed from the classroom other than office personnel.

Conclusions

The conclusion section of this study contains three areas of focus. Implications for action are provided. Additionally, recommendations for future research on this topic are listed. The final section included the researcher's concluding remarks.

Implications for action. The first recommendation for the school leader and staff is to identify to what levels all the adults in the building understand trauma and its effects on students and staff (Flatow et al., 2015). To ensure that all staff have a clear understanding of trauma, community health organizations need to provide regular training for teachers and partner with teachers in creating a culture of trust and safety (Ko et al., 2008). After each professional development session, information regarding knowledge of trauma, its effects, and best-practice strategies to combat those effects need to be gathered from staff to determine gaps in knowledge (Mireles, 2010). The information is

gathered so that staff can be confident in their skills of interacting and supporting students who have experienced trauma.

Additionally, there needs to be clear systems and procedures for students (Cole et al., 2005). These systems begin with a rigorous curriculum that allows students to be curious and challenged while teachers provide academic supports (National Child Stress Network, 2012; Willis, 2006). When students are in the classroom, teachers must be trained and given resources to determine what triggers are to be eliminated to avoid overstimulating students (Bluestein, 2001). When students do become escalated, staff need to be trained in de-escalation strategies, as well as given the option to have a student relocate in order to lower their stress level, learn how to get control over their body, and then come back and feel safe in their environment (Dorado et al., 2016). Finally, there needs to be a system put into place that replaces suspensions as a consequence of undesired behavior inside the school. Suspensions do not alter student behavior and can instead make them angry and more likely to be suspended again (Atkins et al., 2002; Fenning and Bohanon, 2006; Losen and Skiba, 2011).

Additionally, the school leaders need to continue to collect information from their staff and students in order to adjust the implementation of the TSS model. A survey needs to be administered to staff two or three times a year regarding the six elements required for being a TSS (Cole et al., 2005). Students also need to be surveyed at the same time regarding their ability to develop their strengths at school, empowerment of themselves, and their inclusion in developing school policies (East & Kenny, 2007). Student ownership and choice in setting procedures and systems increase the likelihood of success. Based on the findings of behavior referrals and suspensions increasing during

the implementation of the TSS model, school staff needs to continue to develop strategies to implement inside the classroom, as well as time to reflect on the data at regular intervals.

Recommendations for future research. The study of TSS programs and their effects is still a new field. Increased knowledge about the potential benefits and drawbacks of the TSS model is beneficial to school leaders when determining how to support students and staff. It is recommended that a mixed methods study be conducted. The qualitative portion of the study could involve focus groups, which include staff, students, school leaders, and community member regarding the culture of the school as well as the six elements of a TSS. The quantitative portion of the study should continue to focus on all sources of data that relates to standardized student academic achievement, behavioral referrals, and attendance.

An additional recommendation is to have multiple schools at each grade-level bracket in the same district included in a future study. The next study could continue for three to five years after implementation at all sites to best determine the effectiveness of the TSS model. During this time, interviews with focus groups could be conducted each year to track any difference from year to year.

When studying student academic progress, a recommendation is to have multiple assessments used throughout the school year to determine a more specific effect. A new study should consider using benchmark tests that show growth throughout the year as well as multiple summative assessments to gauge the total growth. Additionally, a new study might focus specifically on mathematics and English due to the dependency of science tests on reading and mathematics abilities.

Another recommendation is to add additional research questions to the study specifically regarding the implementation of TSS principles. Including a semester survey of staff regarding their feelings of schoolwide infrastructure and culture, staff training, linking with mental health professionals, academic instructions for traumatized children, nonacademic strategies, and school policies, procedures, and protocols (Cole et al., 2005) would help the researcher determine progress towards the implementation of a TSS model. A final recommendation is to survey students and parents about the schools' ability to develop the strengths of the students, the ability of the staff to help students empower themselves, and the inclusion of parents and students when developing school policies (East and Kenny, 2007).

Concluding remarks. With the increase of ACE occurrences in the lives of students across the country (Bethell et al., 2014), it is vital that school leaders determine what will bring about the most positive change in student academic achievement, behavior, and attendance. The TSS model has only recently been studied to determine its impact. Although the impact shown by the current study on behavior and attendance was not significantly positive, the impact on academic achievement demonstrated this program is a possible step in the right direction. Additional research might help create a more in-depth view of what works within the TSS model to provide supports to students with histories of trauma as well as what is ineffective.

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Appendices

Appendix A: MAP Proficiency Scales

2015-2017 Scale Score Ranges

ELA

	Grade 6	Grade 7	Grade 8
Below Basic	260-467	280-475	290-485
Basic	468-498	476-505	486-517
Proficient	499-549	506-562	518-569
Advanced	550-790	563-810	570-820

Math

	Grade 6	Grade 7	Grade 8
Below Basic	350-469	360-481	390-495
Basic	470-517	482-527	496-543
Proficient	518-554	528-563	544-571
Advanced	555-730	564-740	572-770

Science

	Grade 8
Below Basic	540-670
Basic	671-702
Proficient	703-734
Advanced	735-895

2017-2018 Scale Score Ranges

ELA

	Grade 6	Grade 7	Grade 8
Below Basic	230-370	240-383	250-392
Basic	371-412	384-434	393-442
Proficient	413-437	435-455	443-475
Advanced	438-620	456-630	476-650

Math

	Grade 6	Grade 7	Grade 8
Below Basic	260-387	270-393	310-419
Basic	388-416	394-434	420-467
Proficient	417-437	435-461	468-505
Advanced	438-580	462-600	506-660

Appendix B: IRB Letter of Approval

Baker University Institutional Review Board

August 14th, 2018

Dear Andrew Hargis and Susan Rogers,

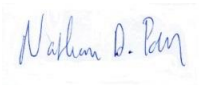
The Baker University IRB has reviewed your project application and approved this project under Exempt Status Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.

Please inform this Committee or myself when this project is terminated or completed. As noted above, you must also provide IRB with an annual status report and receive approval for maintaining your status. If you have any questions, please contact me at npoell@bakeru.edu or 785.594.4582.

Sincerely,



Nathan Poell, MA
Chair, Baker University IRB

Baker University IRB Committee
Scott Crenshaw
Erin Morris, PhD
Jamin Perry, PhD
Susan Rogers, PhD

Appendix C: District Approval

Request to Conduct Research

2017-2018

Name of Applicant: Andrew Hargis

Employee of [redacted] **Schools? Yes** ___ **No** ✓

If yes, location and position _____

Is the research in fulfillment of graduate program requirements and/or in partnership with an external organization (e.g., university, college, business, industry, agency, etc.)? Yes ✓ **No** ___

If yes, name of external organization and lead contact person:
External organization: Baker University

Lead Contact Person and Position: Susan Rogers, Dissertation Supervisor and Advisor

Purpose of research: Fulfillment of doctorate program

Submission Requirements

1. A copy of the complete application submitted for formal approval by a human subjects review board. This application should include, at a minimum:
   a. A brief summary of the purpose and scope of the research including:
   ___ The extent to which the research addresses and/or aligns with the goals of the school district
   ___ Potential benefit of the research to positively impact district, building, or classroom practice
   b. A brief summary of the research methods including:
   ___ Participants
   ___ Selection process
   ___ Remuneration procedures (if applicable)
   ___ Assurance of confidentiality of participant identification
   ___ Consent and assent procedures and documents
   ___ Activities related to the research, including proposed survey, interview, and/or assessment questions/instruments
   ___ Extent of intrusiveness/disruption regarding classroom instruction
   ___ Time/effort requirements of participants
2. ___ Evidence to demonstrate that the proposed research has been formally approved through a human subjects review process.
3. ___ Assurance from the researcher that building principals, teachers, students and/or their parents may opt out of participation without consequence even with approval by the district team.
4. ___ Assurance from the researcher that results will be communicated back to the district upon completion of study. (**Anticipated date of completion:** Jan. 2019)

Signature of Executive Director of Data and Accountability: [redacted]

Team Review Date: 9/6/2018 Approved: X Not Approved: _____

Signature of Deputy Superintendent: X

Signature of Principal(s) of building(s) impacted by research study

Date 9/6/2018

A copy of this form must be returned to [redacted] ***ata and Accountability with all necessary signatures before approval can be granted to conduct research***